Consulting Engineer

August 1956

Participant in Progress

HAROLD J. PETERSEN, newly elected Vice President and Power Consultant of United Engineers & Constructors, Inc., Philadelphia, Pa., brings to UE&C almost 30 years of experience in the designing of steam and hydro-electric power plants. A soft spoken Southerner (although born in Iowa, he spent most of his working years in the South), his voice becomes strong and positive when he discusses the power field—a field he has seen progress from the

—Continued on page 6

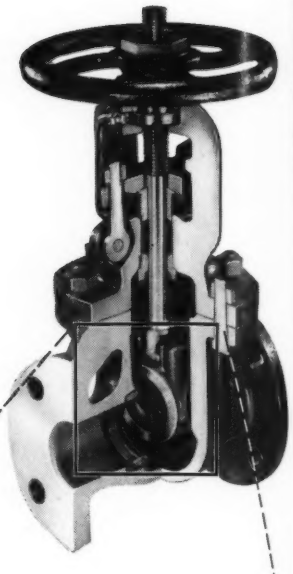
The Consulting Engineer's Professional Magazine

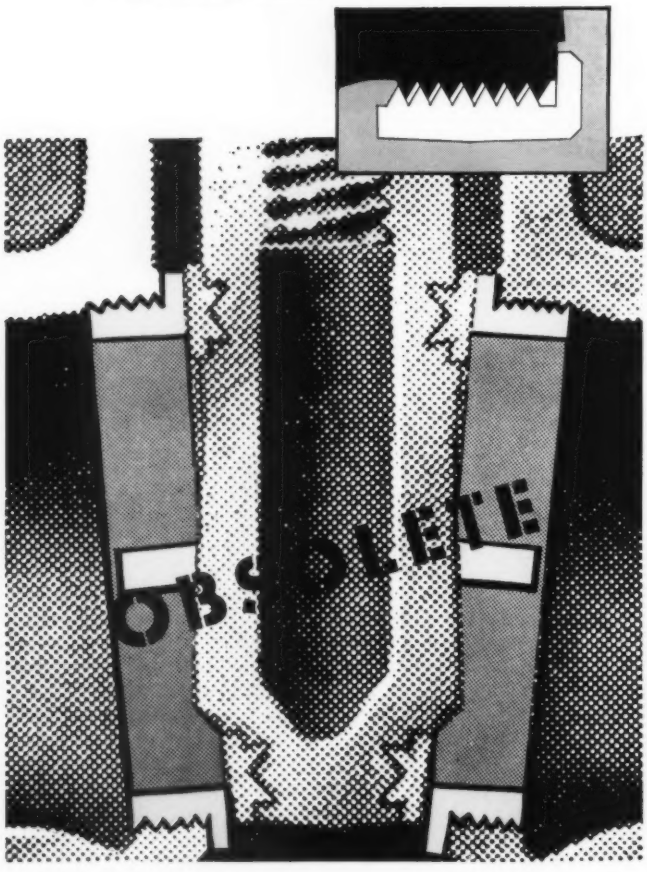
ARE YOUR TRIM SPECS UP TO DATE?

Put an end to iron valve seat ring and stem-wedge problems. Make sure your specifications call for modern, trouble-free OIC end-seated seat rings and T-head stems.

There is no extra cost and yet this superior design will reduce your maintenance overhead many times.

For specification details write for OIC Iron Valve Bulletin No. 1005. The Ohio Injector Co., Wadsworth, Ohio.

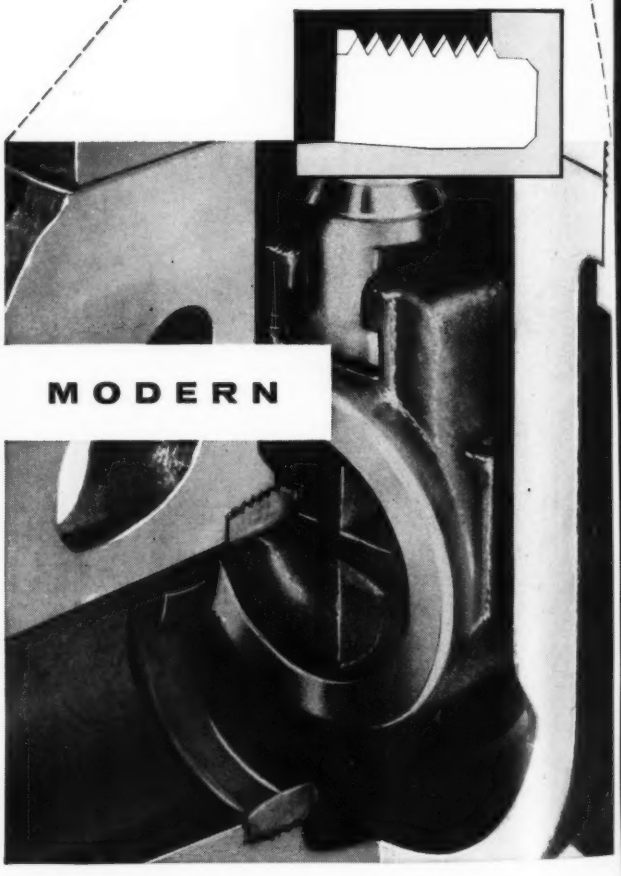




Shoulder-seated rings
Screwed stem-wedge connection

Ring design causes turbulence. Open back of ring is easily eroded. Ring is seated in tension. Continuous operation compresses and tends to loosen it, developing serious leaks.

A screwed stem-wedge connection is rigid. Closing valve under pressure tends to bind wedge, make closing difficult and perhaps bend the stem.



OIC end-seated rings
T-head, stem-wedge connection

Streamlined flow-through. No pockets open to attack by erosion. Ring is seated in compression. Stays tight even in continuous operation.

T-head stem-wedge connection is flexible. Wedge can't bind. Closing is easy and stem is unaffected.

OIC VALVES

FORGED & CAST STEEL, LUBRICATED
PLUG, BRONZE & IRON VALVES

VOLUME 8 NUMBER 2

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Consulting Engineer®

August 1956

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The Consulting Engineer's Professional Magazine

Harold J. Petersen

—Starts on front cover

60,000 kw, 450 psi, 750 F first unit of the Gorgas Plant of Alabama Power Co. that he helped design while working for Southeastern Engineering Company in 1927, to the 250,000 kw, 2000 psi-1050 F, reheat to 1050 F units of the Gallatin Plant, the mechanical design of which he supervised while with the Tennessee Valley Authority.

Experience

His experience in the power field started in 1927 when he joined Southeastern Engineering, the service organization for the Alabama, Mississippi, Gulf, and Georgia Power Companies. During this time in addition to working on design of the Gorgas Plant, at Gorgas, Alabama, for Alabama Power, he also worked on the Atkinson Plant, at Atlanta, for Georgia Power. For the next five years he served as a mechanical engineer for the Safe Harbor Water Power Corporation, of Baltimore, Md., which designed and built Safe Harbor Dam on the Susquehanna River above Conowingo. In 1936 he took over as Chief Designing Engineer for the City of Birmingham, Alabama, where he supervised the design of an industrial water supply system, with an impounding dam, a 70 million gpd pumping and chemical treating plant, and 60 miles of 60 inch distribution line. When the Birmingham job was completed in 1937, he joined TVA, and, before election as vice president of United Engineers this spring, served as Chief Mechanical Engineer for the Authority. In this position, Petersen supervised the designing of more than 7.5 million kw of steam power equipment at seven Tennessee Valley Authority steam plants.

Petersen believes that the free exchange of ideas between engineers is largely responsible for the advances in design that have made possible the new high pressure, high temperature power plants.

"As I see it," he says, "the engineer's responsibility is to participate in the progress of the science. Manufacturers necessarily must take the lead in research, since they know what the material barriers are. The engineer must be willing to take the calculated risk in the use of new equipment.

"It is tremendously important to design into a new plant the most advanced equipment and concepts of engineering because once the plant is built you are stuck with it for the life of the plant—often more than 30 years. It is very difficult to modernize an obsolete plant, and a plant becomes obsolete when it can no longer provide power at a competitive price.

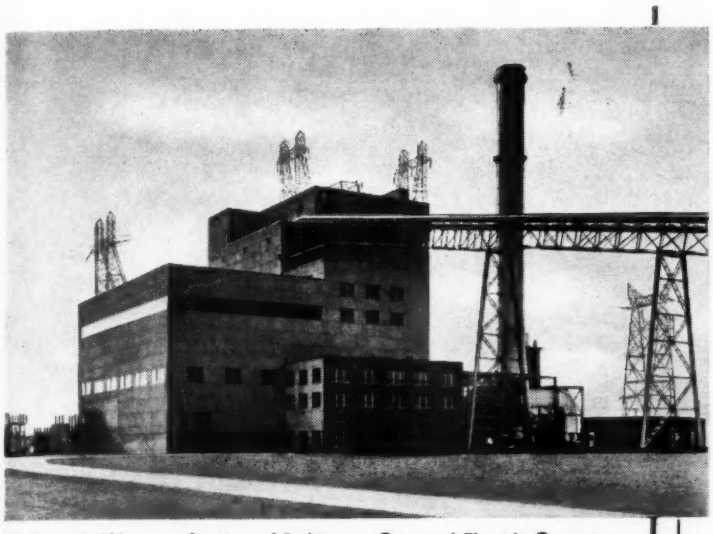
New Ideas

"The main job of a power engineer is the search for new and advanced ideas. Of the 40 units TVA installed under their expansion program, the trend was continually to larger capacities, higher temperatures and pressures in the search for increased efficiency. At TVA's 1,600,000 kw Kingston Plant, we installed the first 3600 rpm turbine. It had 26 inch last-stage exhaust blades. The first four units (each 150,000 kw) at Kingston have natural circulation boilers. The boilers for the last five 200,000 kw units have controlled circulation—a new concept in that size at that time. These features all required the taking of a calculated risk, but their successful operation makes possible lower-cost power and advances the art.

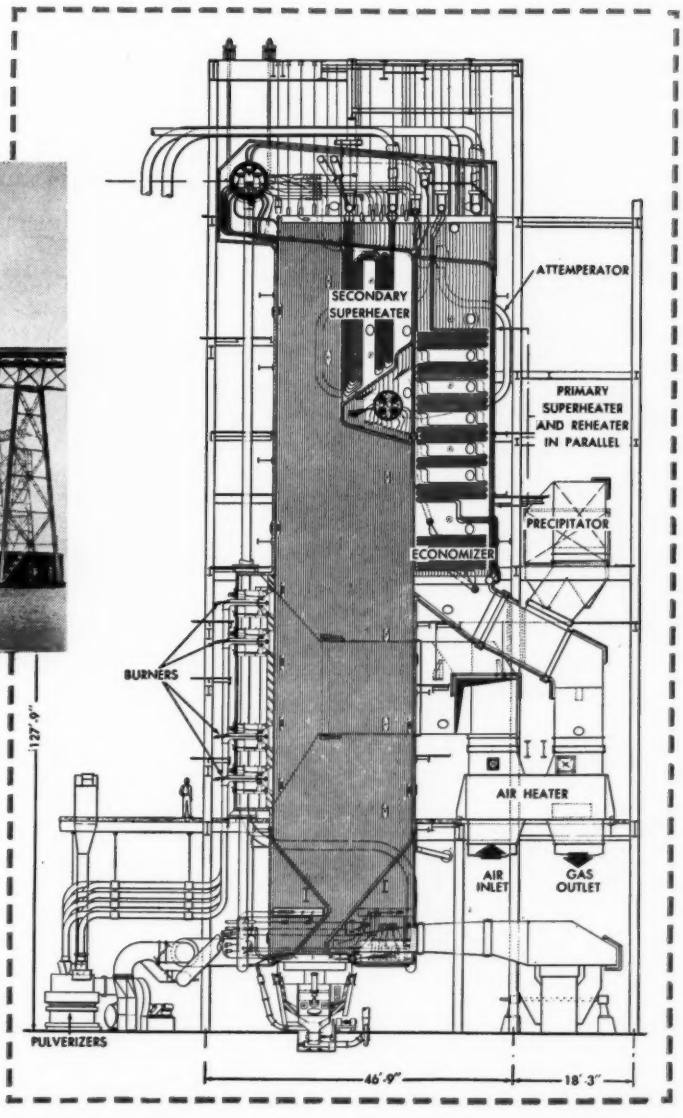
"Privately and publicly owned utility company engineers visited TVA plants and adapted any new ideas that they saw and liked to their own needs. We also got ideas from them. This fraternal feeling among engineers transcends political considerations. As engineers for TVA we operated in the same way as do engineers with any other employer and were subject to the same checks and balances as the engineers for a privately owned power company."

Appreciation of Harold Petersen's competence and dedication in his work with TVA was recorded on the final report issued by his immediate superior, as, "His service represents a challenge of achievement to those in the public service."

Since joining the staff of United Engineers & Constructors, Petersen has been elected a member of the Prime Movers Committee of Edison Electric Institute, one of the most important policy decision making groups for the private power industry. He is also a member of the Hydraulic Prime Movers Committee. He has served as Chairman of the East Tennessee Section of the American Society of Mechanical Engineers, and has authored many articles for engineering magazines. ▲▲



Herbert A. Wagner Station of Baltimore Gas and Electric Company.



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Baltimore Gas and Electric's

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Equipped with Another B&W Radiant Boiler

Baltimore Gas and Electric Company, moving forward to meet the growing industrial, commercial and residential energy requirements of Greater Baltimore, now has more than 955,000 kw installed capacity.

B&W Boilers have long given dependable service to Baltimore Gas and Electric, and when the utility was choosing equipment for the Herbert A. Wagner Station, its engineers selected a B&W Radiant Boiler with reheat. The unit delivers 950,000 lb of steam per hr. Design pressure is 2075 psi, with superheater outlet pressure of 1875 psi and temperatures at 1000 F. Reheat temperature is 1000 F.

B&W Boilers such as that installed in Herbert A. Wagner Station are the product of almost a century of boiler making experience, combined with the practical advances gained through B&W's continuing program of research and development—a combination that is making basic contributions toward increasingly efficient steam-electric power generation. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

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BOILER DIVISION

READERS' COMMENT

Harvard Engineers

May I take the liberty of calling your attention to what I believe is an error in your "Scraps & Shavings" column? On page 18 (June C E) you state, "Since Harvard does not teach engineering on an undergraduate level, ..."

Perhaps your misconception harks back to the period a decade or so ago when there was a separate graduate school of engineering at Harvard. Now it is our aim to give engineering instruction at all levels, although — due to limitations in funds — with more accent on certain branches than on others in the more advanced part of the curriculum.

J. H. Van Vleck, Dean
Harvard University
Div. of Engineering and
Applied Physics

● OUR APOLOGIES TO HARVARD AND DEAN VAN VLECK. HARVARD IS ACCREDITED IN ELECTRICAL, COMMUNICATIONS, ENGR, PHYSICS, AND SANITARY.

Violent Reaction

I had a violent reaction to your "Scraps & Shavings" page in the May 1956 issue of CONSULTING ENGINEER. My reaction stemmed from the use you made of the word "trade." I don't like that word in connection with the engineering profession in any way, shape, form, or fashion. I think it is just as incompatible with the engineering profession as an engineer's union.

T. Carr Forrest, Jr.
Forrest and Cotton
Dallas, Texas

European Tour

As one of the American engineers who accompanied your Editor, Mr. Hunter Hughes, on his recent tour to meet the consulting engineers of Europe, I wish to express appreciation of Mr. Hughes' efforts in this matter.

The imagination and hard work that went into conceiving the program, making the contacts with the European engineers, and following out the planned program have been of great value to the American engineers who were able to take the trip, and the results will have a wide influence among other consulting engineers. There is much benefit to be derived from interchange of ideas among professional people of similar interests in different countries. I feel sure that the contacts which have been started, as a result of Mr. Hughes' efforts on this occasion, will prove to be of increasing value in future years. It is sincerely hoped that these contacts may be renewed and extended as occasions permit.

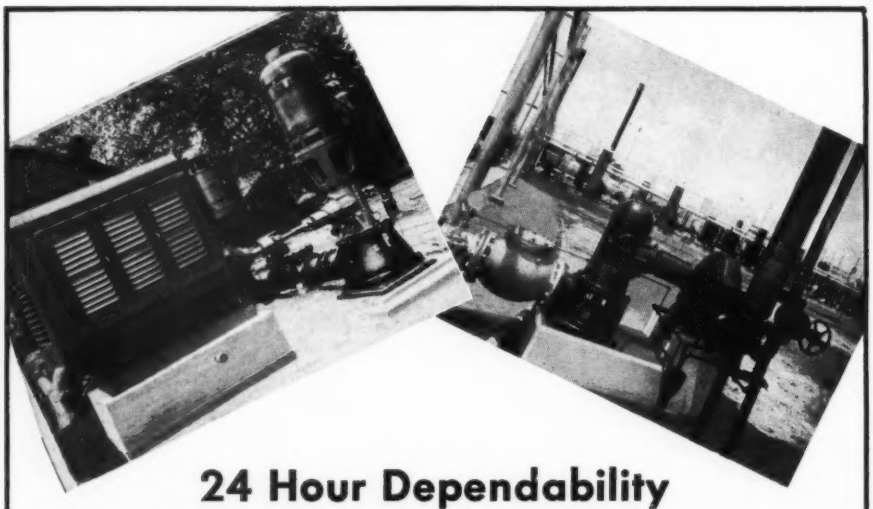
Please be assured that the consulting engineers of the United States understand and appreciate the good work which your magazine is doing under the guidance of your very capable editor.

William W. Moore
Dames & Moore
San Francisco, Calif.

Corporate Practice

In your June "Readers Comment" Mr. W. F. Ryan, a Vice President of Stone and Webster Engineering Corp., says, of an article by former Missouri Senator McCawley, "The Corporate Practice of Engineering" — "It is a very fine statement and may be the basis of agreement at least among the honest and sincere professional people involved in this controversy." The apparent implication in this statement that one may not be honest or sincerely professional if he disagrees with the McCawley article must have disturbed many of your readers.

Registered engineers in New York State are very familiar with many devices in addition to that pro-



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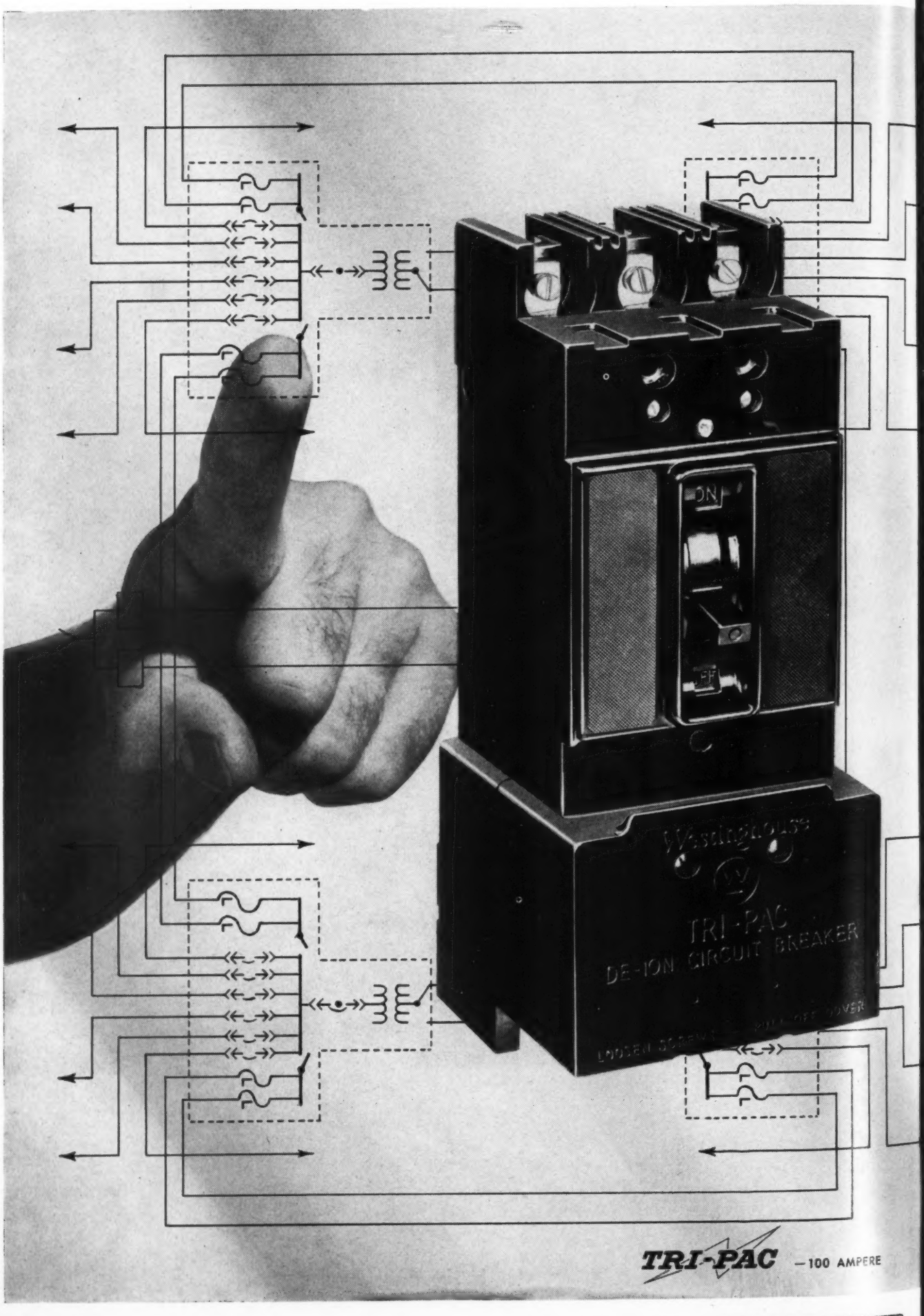
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OFF
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DE-ION CIRCUIT BREAKER
TRI-PAC —100 AMPERE

100,000 amps gets a new boss—the Westinghouse Tri-Pac breaker

The Westinghouse Tri-Pac breaker is the smallest protective device that can be used where 100,000 amps can be poured into faults. It combines the inherent advantages of both the molded case breaker and fusible current limiters to positively protect electrical circuits—throughout the range from overloads to fault currents that could build up to 100,000 amperes, if not stopped.

Co-ordinated triple circuit protection—thermal, magnetic, and current limiting—in one compact breaker. At much less cost than larger air circuit breakers of equivalent ratings and with more safety and convenience than switches combined with fusible elements. That's why Tri-Pac offers the most practical and economical solution to the constantly increasing interrupting requirements of network systems and those fed by large transformers.

The breaker trip portion of Tri-Pac handles overloads and moderate faults—eliminating fuse replacement headaches and costs. On higher currents, the current limiters in Tri-Pac trip faster, insuring the prompt protection required at those high currents. In Tri-Pac the current limiters and the breaker are co-ordinated so that the current limiter will trip at and above a point slightly under the interrupting capacity of the breaker. Below that point, the limiters remain undamaged, letting the breaker do the work.

Fault single phasing—a drawback of fuses—is averted by Tri-Pac breakers. The blowing of a current limiter actuates the breaker trip bar and all poles of the breaker open simultaneously. And when a high fault current is interrupted, indicating buttons on the current limiters clearly designate the troubled phase.

NETWORK SYSTEM PROTECTION

With today's increased use of network systems, the possibilities of 100,000-amp fault currents are not uncommon. New Tri-Pac breakers insure positive protection against all system current faults—large or small—at a new and greater economy.

HERE'S MORE INFORMATION ON TRI-PAC

A Westinghouse sales engineer can show you additional reasons why the new Tri-Pac breaker is your best buy for powerful circuit system protection. Call him today.

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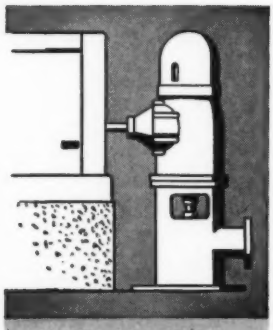
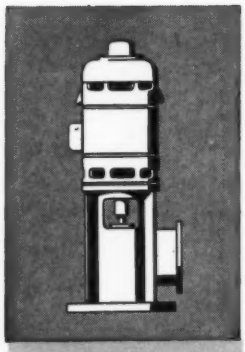
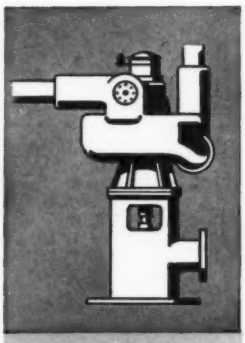


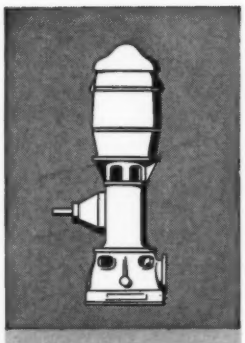
Internal Combustion Engines



Electric Motors



Steam Turbines



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posed. . .They will not be surprised either to read the warm endorsement of the McCawley proposal expressed in a letter preceding Mr. Ryan's in the same June issue, by the Executive Director of the self-designated Committee on Engineering Laws (CEL). The New York State Society of Professional Engineers has spent many thousands of dollars in opposing legislation introduced by the CEL and, aided by other learned professions in the state, they have successfully defeated four attempts to enact corporate practice bills. . .

The moral nature of professional responsibility prevents an artificial or non-professional person from discharging it. To attempt to transfer this basic responsibility to any employed professional is an infringement of his rights as he is subject to possible punitive action under the Registration Law while denied an authoritative voice in setting the ethical policies and contractual terms under which his responsibility must be discharged.

How far the CEL has wandered from this principle in its various proposals for corporate practice is indicated by the following quotation from its 1956 Milmoe Bill introduced in the New York State Legislature—

> "Any act by a licensed professional engineer, as an employee of a corporation even if performed under direction, shall not relieve him in any way from being subject to the provisions of sections seventy-two hundred ten and seventy-two hundred eleven hereof . . ."

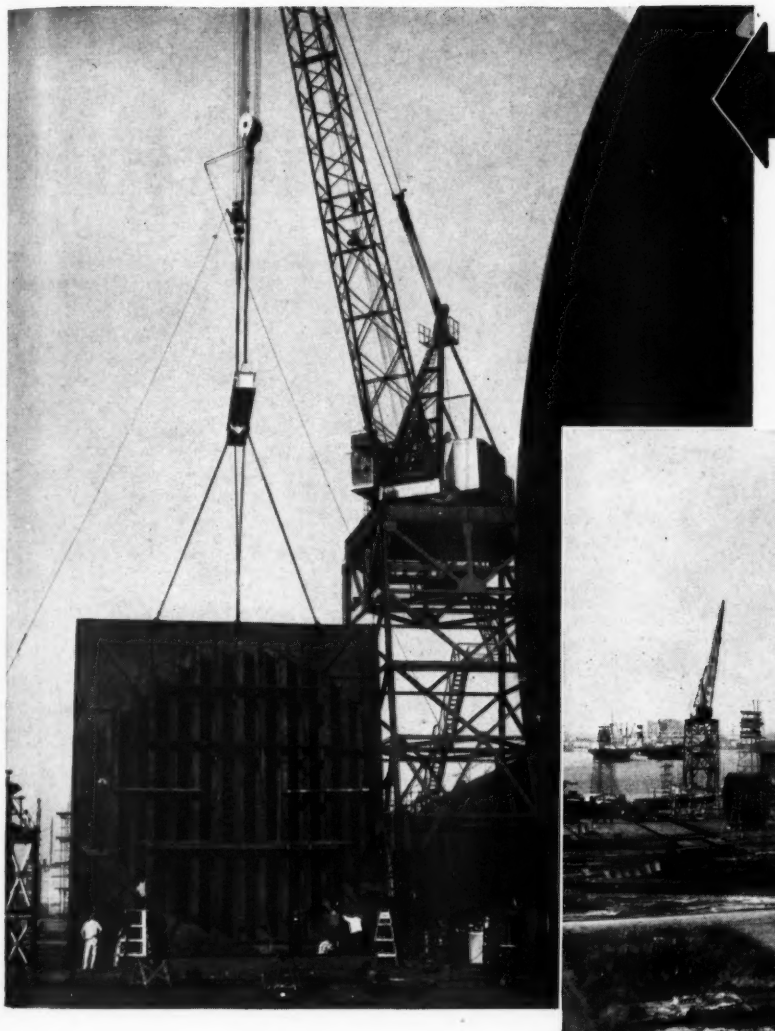
The two sections . . . referred to above are the disciplinary procedures under which the employed professional engineer could be disbarred from practice for all time while his corporate employer would be protected by the limited liability of his corporate practice.

James P. O'Donnell, P. E.
New York, N. Y.

Changing Conditions

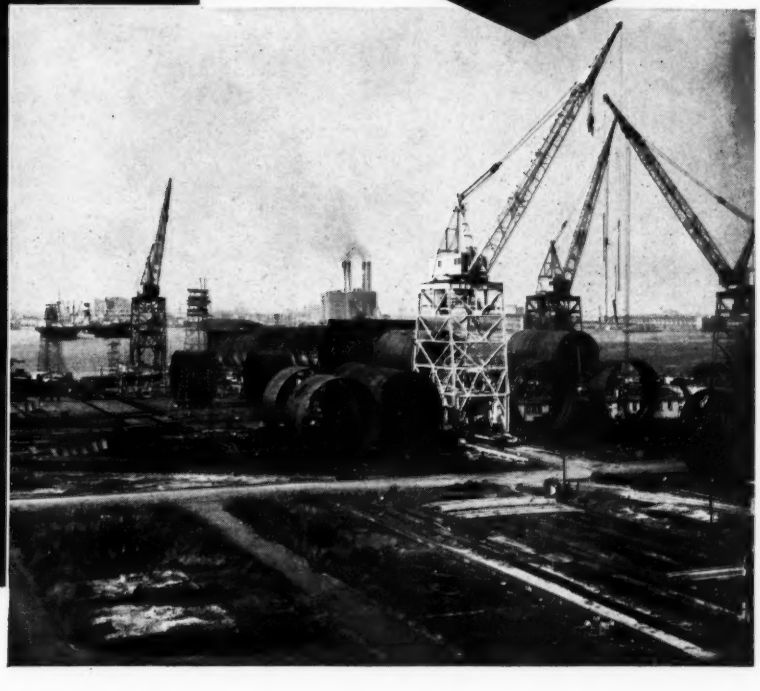
Your article "Consultants Can Hire the Men They Need" (May CE, p. 75) contains interesting facts and comments on the personnel problems of consulting engineers. Here in the Philadelphia area engineers' salaries have increased between 10% and 15% in the past year, but these increases have been made predominantly by industrial firms, not by consultants. If, as you say, consulting engineers cannot afford to pay market-rate salaries it would seem to indicate that their fees are too low.

However, there is also a psychological factor. . . Conservatism is so deeply embedded in their general



Clyde Whirley spots a water-tight bulkhead at one end of a 33 foot diameter tube section for the Baltimore Tunnel beneath the Patapsco River at Baltimore, Maryland. Perfect load control, provided by Whirley, assures fast, accurate and safe handling of all loads.

Four Clyde Whirleys in New York Shipbuilding's Camden, New Jersey yard, handle the various sections required for the twin tube tunnel as shown in the center background. Sections are launched and towed to fitting-out station at tunnel site.



New York Ship uses four Clyde Whirleys on unique, "assembly-line" tunnel project

Nine, huge, twin tunnel sections, built by New York Shipbuilding Corp. for Merritt-Chapman & Scott Corp. parent company of New York Ship and general contractor for the Baltimore Harbor tunnel project.

This assembly line process, developed by New York Ship, consists of 20 foot long sections, 33 feet in diameter, built and fabricated into 300 foot long sections. These are secured parallel to each other to provide twin tubes for vehicular traffic. Each twin tube section is fitted with water-tight bulkheads at both ends and ballasted with approximately 3000 tons of concrete placed in forms beneath the tubes to form a boat-like base. These sections are locked into position in a trench dredged across the bottom of the river; covered with backfill and then completed on the interior.

The many exclusive features of Clyde Whirleys, enables them to give the fatest, safest and most efficient service for handling any type of heavy cargo or materials.

For complete information, write for Bulletin 12.

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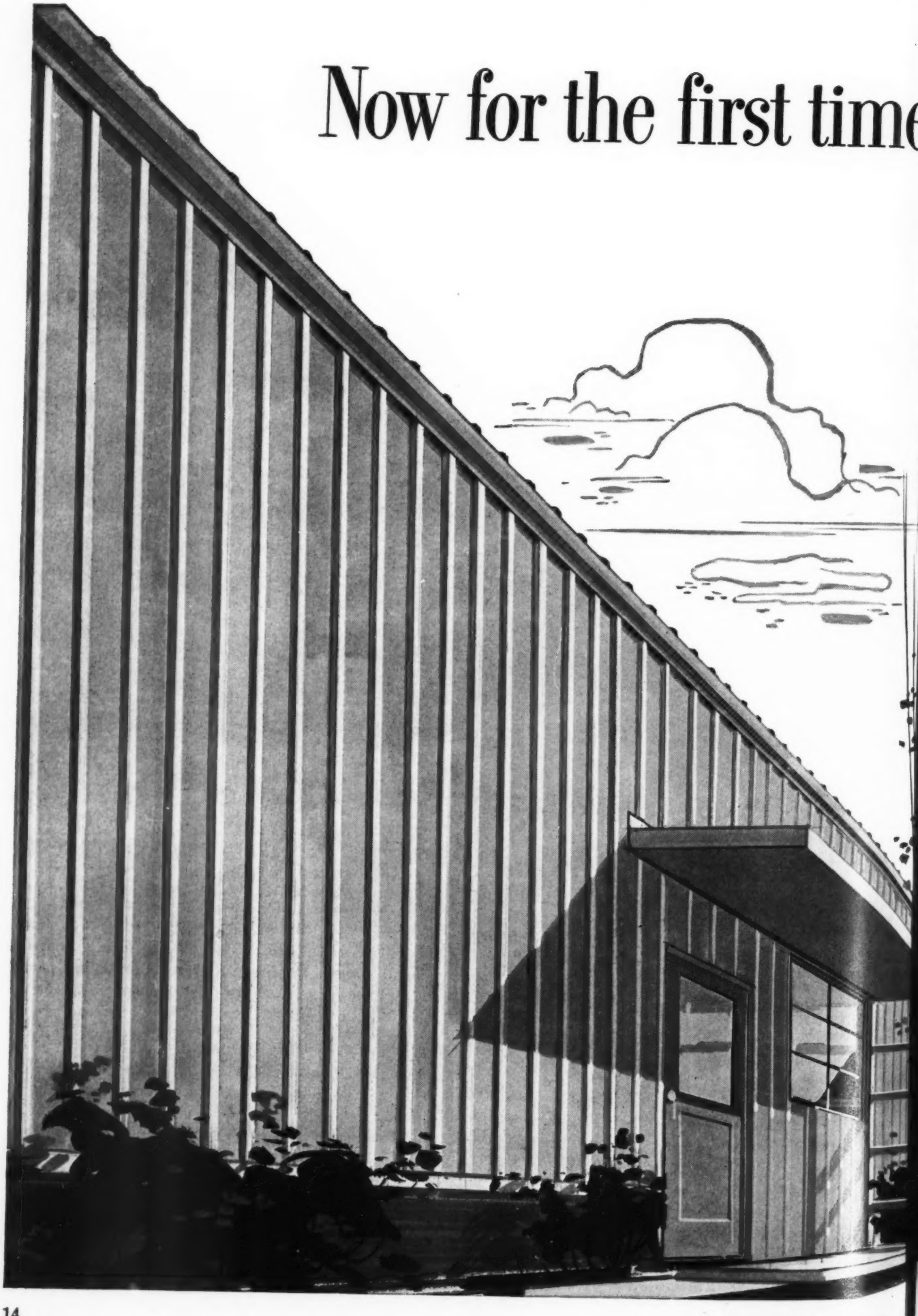

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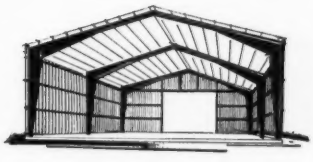
The eye-appeal of far more expensive materials, plus the strength and low cost of steel! That's what you get in the new Stran-Steel Rigid Frame building line with exclusive *Stran-Satin* wall. *Stran-Satin*, a new satin-finish steel developed by National Steel, gives these buildings a beauty and attractiveness never before achieved in pre-engineered metal buildings.

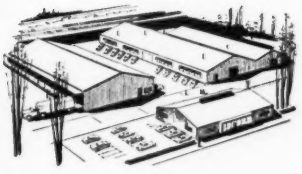
Stran-Satin beauty is more than skin deep. Spangle-free *Stran-Satin* provides a durable, non-corrosive, full commercial zinc coating, plus a new rib design that combines strength with advanced styling.

This exclusive exterior wall makes Stran-Steel's new clear-span Rigid Frame buildings the most attractive metal buildings available for manufacturing or processing, for warehousing or distribution, for service or repair shops. Five clear-span widths—40, 50, 60, 70 and 80 ft.—offer you unlimited flexibility for the size and shape building best suited to your needs.

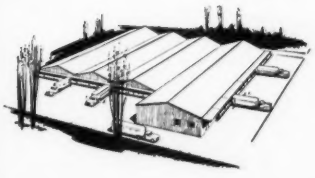
With these good-looking Stran-Steel Rigid Frame buildings you get quality construction, fast erection, easy expansion. For more information call your local Stran-Steel Buildings dealer or send coupon.



Open Clear-Span Interiors for . . .



Manufacturing and Processing Plants



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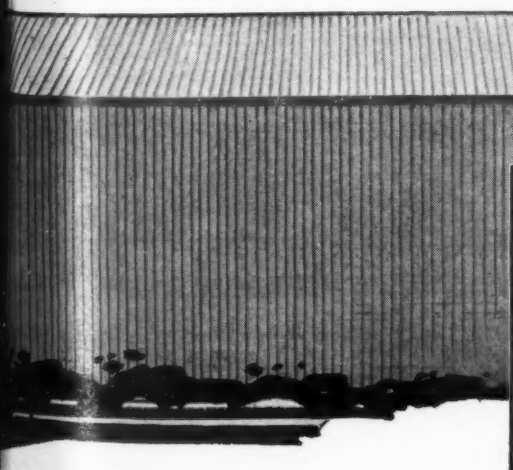

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E

Sharp visibility for *all* your liquid levels with

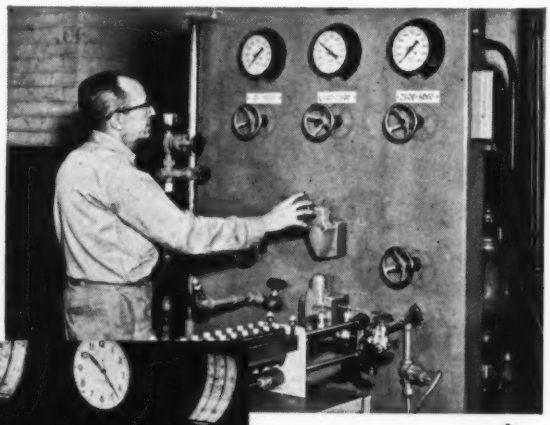
EYE-HYE®

Remote Reading Gage

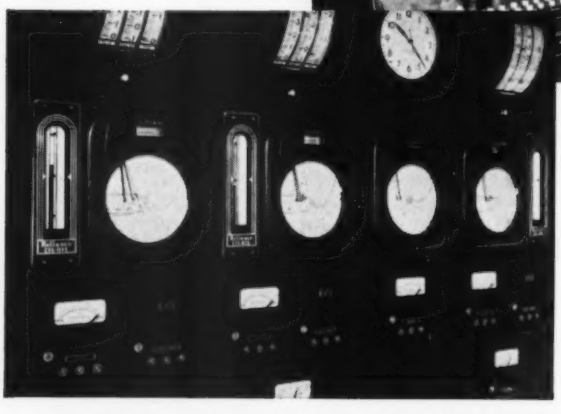
Most important for quick-reading mistake-proof gage equipment are your main boilers — naturally! But other liquid levels need watching — some that can't have "main floor" prominence or convenience.

EYE-HYE brings *all* gage reading out front, to a central point or to locations frequently passed by operators. (See list below.)

Simple, fool-proof, easy to read (illuminated green liquid represents water level), EYE-HYE is made for pressures up to 2500 psi — water level variation to 12 feet. New wide vision face plate makes reading visible from wide area. Write for specific recommendations to bring your gage facilities up to date.



Close-up of panel board section at an important research center where 3 EYE-HYEs serve the main boilers.



How EYE-HYE assemblies get hydraulic test at nearly twice their cataloged pressure rating.

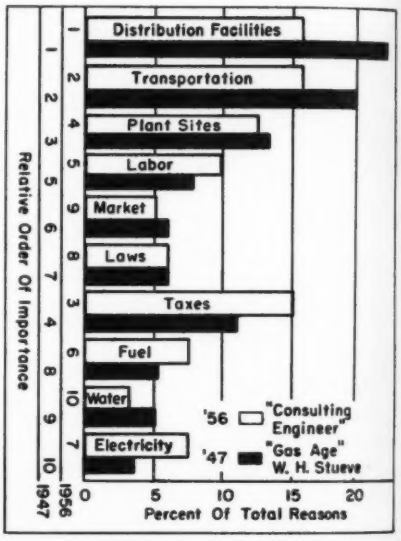
Main boilers **Flash tanks**
Feed Water Heaters
Water treatment systems
Waste heat boilers
Storage tanks

The Reliance Gauge Column Co., 5902 Carnegie Ave., Cleveland 3, Ohio

outlook that they cannot adapt to changing conditions. Because they worked for $12.00 per week in '08 they think that young engineers today should gladly accept comparably low pay.... they think it almost unethical for an engineer employee, acting in strict accord with *laissez faire* doctrine, to demand the highest wage he can get.

As your article indicates, the engineer shortage, like the teacher shortage, is probably spurious. There is no real shortage of engineers, only a shortage of cheap engineers . . .

C. W. Griffin
Robert E. Lamb & Son, Inc.
Philadelphia, Pa.



Plant Site Selection

I have read with considerable interest the article on page 61, May 1956 . . . "Plant Site Selection."

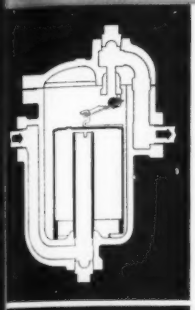
After reading the article, I found a similar article I had prepared in 1947, published in *Gas Age*, December 11, 1947, on the same subject matter.

I have prepared a comparative analysis and plotted the results . . . in terms of percentage of reasons why industries move or consider moving. I have also attempted to reconcile and join in common the "important factors" your staff used (11) with the 14 factors in my study. Note that the relative importance of the various factors has changed somewhat from 1947 to 1956—almost 10 years.

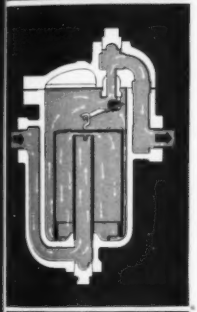
My article was compiled primarily for the southwest to offset the claims of the public power fanatics that industries only consider moving to territories where "cheap give-away" electric power was available.

W. H. Stueve
Consulting Engineer
Oklahoma City, Okla.

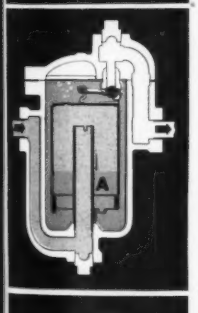
How Armstrong Trap Design Improves Plant Efficiency . . .



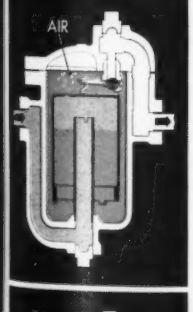
1 When trap is first installed, the inverted bucket is down and the valve is wide open. The large clearance between valve and seat minimizes restriction to condensate flow, contributing to large capacity.



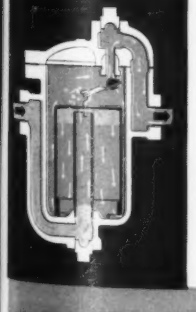
2 When steam is turned on, note how condensate (solid color) flows down between bucket and trap body, then up and out through orifice. Dirt is held in suspension and washed out when valve opens.



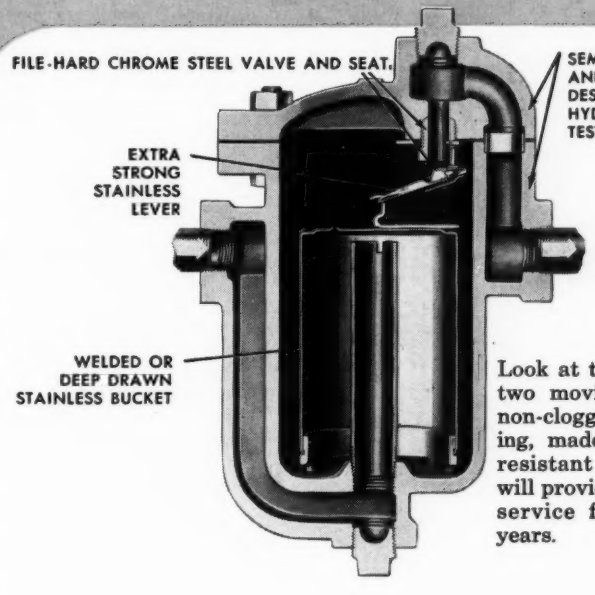
3 When steam reaching trap displaces less than ⅔ of the water in the bucket, it floats, closing the valve. Generous safety margin (dimension A) insures that steam will never reach trap orifice.



4 When more condensate enters trap, the bucket loses buoyancy and pulls on valve lever. (Note how incoming air passes through bucket vent and collects at top of trap, awaiting discharge.)



5 When weight of bucket times leverage overcomes pressure on valve, trap opens, creating momentary pressure drop that "pumps" condensate and non-condensibles from unit being drained.


FILE-HARD CHROME STEEL VALVE AND SEAT.
SEMI-STEEL BODY AND CAP. 250 LBS. DESIGN PRESSURE—HYDROSTATIC TESTED AT 500 LBS.
EXTRA STRONG STAINLESS LEVER
WELDED OR DEEP DRAWN STAINLESS BUCKET

Look at this trap. Only two moving parts. It's non-clogging, non-sticking, made of corrosion resistant materials. It will provide trouble-free service for years and years.

Time-Tested Inverted Bucket Principle Provides Five Cost-Reducing Benefits:

The modern Armstrong Trap is unsurpassed in these five major contributions to plant operating efficiency:

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4. Continuity of operation—the trap always opens for condensate; the simple, sturdy, self-cleaning mechanism insures continuous operation between inspections without interruption of processing.

5. Low Maintenance—no trap has ever gained so enviable a record for trouble-free service—ask anyone who has kept records.

Free: Steam Trap Book—
44 helpful pages on trap selection, installation maintenance, physical data and prices. Call your local Armstrong Representative or Distributor, or write:

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ARMSTRONG *Inverted Bucket* **STEAM TRAPS**

ALLIS-CHALMERS builds equipment for

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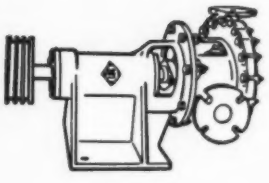
MR. CONSULTING ENGINEER... *How many can you identify*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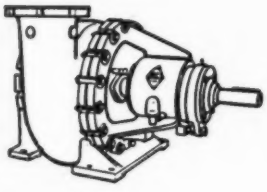
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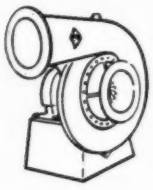
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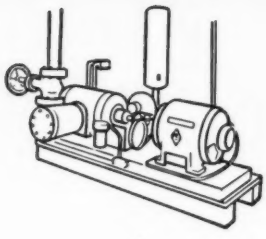
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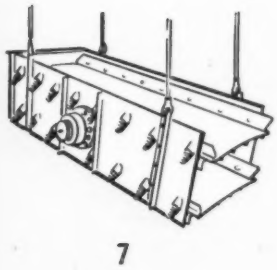
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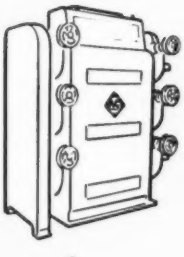
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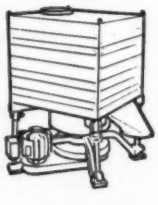
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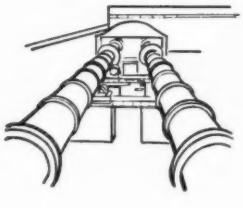
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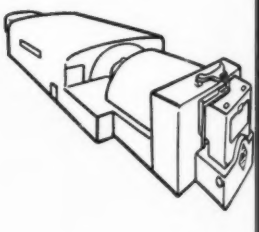
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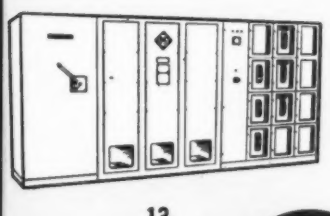
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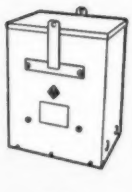
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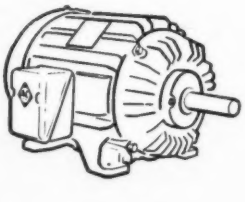
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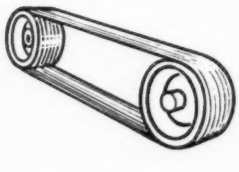
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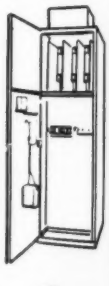
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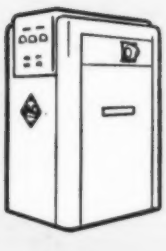
Question... What single manufacturer builds all this equipment and MORE for the CHEMICAL PROCESSING INDUSTRIES?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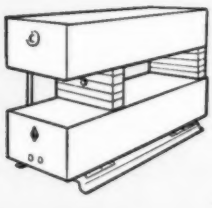
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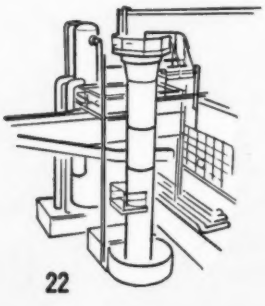
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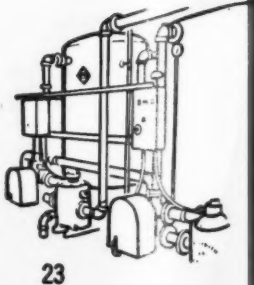
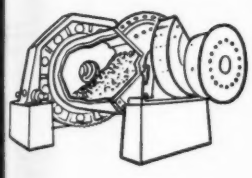

23

Send for Bulletin 25C6177, covering all Allis-Chalmers equipment for the process industries. This bulletin as well as literature covering specific equipment lines is yours for the asking. Write Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS

ALLIS-CHALMERS builds equipment for liquid handling, air and gas handling, size reduction, dry classification, washing, pyro-processing, and materials handling. This processing machinery can be further integrated with electrical generation, distribution and utilization equipment — all manufactured by Allis-Chalmers. When you specify Allis-Chalmers, you specify machinery and equipment *designed to work together, backed by undivided responsibility.*



6

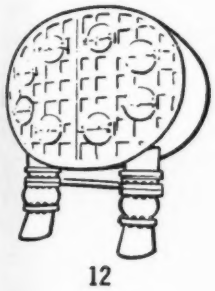
There's No Guesswork

Allis-Chalmers offers the consulting engineer all the help he *wants or needs.* In working with consultants, your A-C representative uses the technical skill and experience of the many Allis-Chalmers engineering departments. Their recommendations are backed by research, by testing and pilot plant facilities, by experience gained in solving many thousands of equipment application and coordination problems.

Unbiased Recommendations

Because Allis-Chalmers builds many types and sizes in a given equipment line, recommendations are dictated only by specific requirements.

Most important is the fact that Allis-Chalmers interest in the problem never ends. Your client can be sure of getting periodic equipment checkup and fast emergency service when required.



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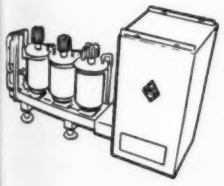


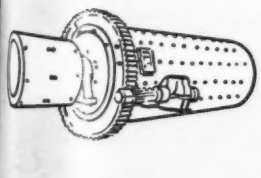
18

You get MORE when you specify Allis-Chalmers

The "plus" you get is the Allis-Chalmers approach to equipment application. It's called "*coordineering.*" As manufacturers of the most diversified line of processing and electrical equipment, A-C maintains separate departments for each product—each staffed with specialists. "Coordineering" results from an interdepartmental exchange of ideas and of thinking, planning and engineering that precedes the integration of equipment.

Answer... ALLIS-CHALMERS

manufactures the most complete and diversified lines of equipment for Unit Operations



24

How many DID you identify?

1. Process Pump; 2. Solids Handling Pump; 3. Centrifugal Blower; 4. Rotary Compressor; 5. Gyratory Crusher; 6. Grinding Mill; 7. Vibrating Screen; 8. Roller Mill; 9. Gyratory Screen; 10. Rotary Kiln; 11. Turbine Generator; 12. Condenser; 13. Unit Substation; 14. Dry-Type Transformer; 15. Explosion-Proof Motor; 16. V-belt Drive; 17. Motor Control; 18. Mercury Arc Rectifier; 19. Dielectric Heater; 20. Manlift; 21. Metal Detector; 22. Continuous Contact Column; 23. Water Conditioning Equipment; 24. Blade Washer

CHALMERS

A-5153

Scraps & Shavings

IN A RECENT CONVERSATION, a consulting engineer made the statement that engineers in private practice are getting only about 25 percent of the business that should go through their offices. When he said this, he was sitting at a luncheon table with a number of other consultants, and they took exception to his figures. He suggested that they make an estimate for themselves.

"First," he said, "consider the work now being done by the Army Engineers and other Federal Agencies, work that could be done by consultants. Next, look at the State Highway Departments and the State Architectural Commissions. How much of that work is going to engineers in private practice? Then there are the county and municipal engineering departments and the special parks, buildings, and grounds agencies. Add up all of this, and you will find a lot of business we are missing."

Then he listed other competitors—architects who do engineering without the services of engineers, contractors who do their own designs, manufacturers who offer "free" engineering, large industrial firms that do their own design and specifications through central engineering departments . . . Add to this the projects done by the "kitchen sink" engineers, the "sundowners," who work at one job during the day and then do consulting at night.

Looking at it that way, it could well be that 75 percent is going through other channels.

The trouble, according to this man, lies in the small number of consulting engineers. Only about 5-6 percent of the engineers in the country are in private practice—and nearly every one of them is as busy as a beaver. The answer is to get more engineers into private practice so that gradually the load can be shifted away from government engineers, contractors, and other groups and put in the hands of consultants.

This sounds like a good idea, and there is a trend in that direction. The trend will grow as the great new highway program gets under way. Many of the highway departments recognize the obvious advantage of using consultants for much of this work rather than increasing the number of employees of the state. Also private construction is turning more and more to the consultant. And as the number and size of the projects grow, there is no doubt but that there will be a need for more consulting engineers.

It would be shortsighted, indeed, for consulting engineers now firmly established in business to fight an increase in the number of engineers engaged in private practice. Whether or not the figures suggested by that one consultant are correct, there is obviously plenty of work now being done by others that could go to consultants. An increase in the number of consultants naturally would result in more of this work coming their way. This would be good for the public as well as for the consultant. For example, a legislative study recently released in California showed that large savings could be made by the State by using consulting engineers for highway projects.

Recognizing the need for more good men in private practice is not enough. It is up to the established firms to assist in bringing about this increase. It is known that there is hardly another profession in which it is so difficult to get started. An engineer working for industry or government, or even for a consulting firm, faces enormous problems in attempting to go out on his own. It is a common feeling that it is foolish for an engineer to go into private practice unless he has enough capital to keep his business and his family going for at least two years without a project. These days that is a lot of money. It discourages even the best.

It is up to the established consulting engineers to help these men—the good engineers who would make good consultants. To some extent this is already being done. A firm in Chicago encourages its project managers and other top employees to go into business for themselves. Work is subcontracted to them until they have a well established business of their own. This type of encouragement is not uncommon, but it is far from general practice.

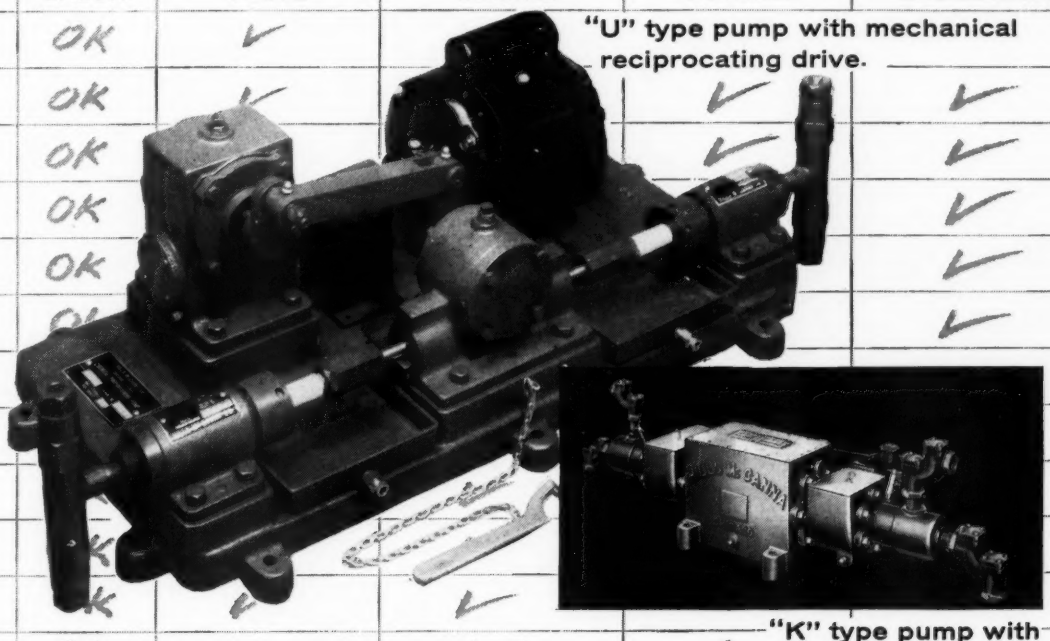
As has been pointed out, it is not that we have so much a shortage of engineers as that the engineers we have are not put to the best use. It is in private practice that talents of the engineer are used to the ultimate. That is what we need—more consultants; fewer engineers working as employees.

A high percentage of the medical doctors and lawyers are in private practice. The same should be true for engineers. It would be better for the public, the profession, and the individual engineer. ▲▲

Why the FIRST COST is the LAST COST with HILLS-McCANNA METERING PUMPS

PUMP MAINTENANCE REPORT

MONTH	CHECK	VALVE	STROKE	PLUNGER	LUBRICATION
JANUARY	OK	✓			
FEBRUARY	OK	✓		✓	✓
MARCH	OK			✓	✓
APRIL	OK				✓
MAY	OK				✓
JUNE	OK				✓
JULY					
AUGUST					
SEPTEMBER					
OCTOBER	K				
NOVEMBER	K	✓	✓		
DECEMBER	OK	✓	✓	✓	



"U" type pump with mechanical reciprocating drive.

"K" type pump with hydraulic drive.

HILLS-McCANNA dependability pays off in lower maintenance . . . longer life . . . greater accuracy . . . cost-saving versatility

Maintenance reports from the leaders in many different industries prove the low-cost operation of Hills-McCanna metering and proportioning pumps . . . tell why these pumps are specified for installations requiring the finest equipment. Part replacement is remarkably low because there are few points of wear. Routine maintenance is simple and economical thanks to special Hills-McCanna features, such as separate interchangeable check valves and easy, precise stroke adjustment (even while in operation when desired). Working parts are completely enclosed to keep them dirt-free. All U Type pump bodies are interchangeable in the housing for quick convertibility. Straight reciprocal drive eliminates bushing replacement. And, you'll find Hills-McCanna pumps mighty easy to install.

If you must continuously meter or proportion small volume flows with great accuracy, you'll want to consider the "U" type pump—available in 1, 2, 3 and 4 feed units. The "K" type pump —also available in 1, 2, 3 or 4 feed units—will meet your larger flow requirements.

Hills-McCanna can furnish a pump to meet *every* type of installation . . . with a wide choice of corrosion, wear and abrasion-resistant liquid ends . . . in capacities and pressures for every need.

Write for full facts now. You'll be dollars ahead tomorrow by investigating today!

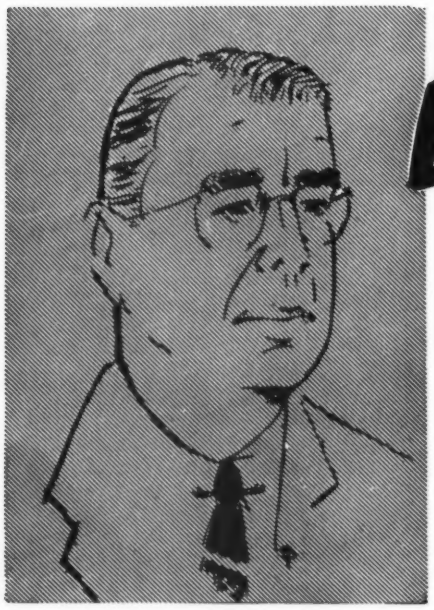
A dependable NEW HEART to put NEW LIFE into your chemical metering system!

HILLS-McCANNA COMPANY

2446 W. Nelson Ave., Chicago 18, Illinois

metering and proportioning pumps

also manufacturers of: FORCE FEED LUBRICATORS • DIAPHRAGM VALVES
MAGNESIUM ALLOY SAND CASTINGS



Economic News Notes

E. F. MacDonald
INDUSTRIAL ECONOMIST

$ BILLION PROGRAM — New York City's man-of-many-jobs, Mr. Robert Moses, has stated that NYC should build, come what may, $1 billion of highways over the next 12 years. He warned that there would be "headaches, both engineering and political" to such a program, pointing out that arterial highway construction had been blocked in a number of cities "not for engineering reasons, but because the city fathers had given in to opposition" to land condemnation and other necessary features of such a program.

OPPORTUNITY KNOCKS — A Belgium steelmaker has been awarded a contract for 1,200 tons of rolled steel sections for a New York City skyscraper. Ability of the Belgium firm to deliver the entire tonnage in the relatively short period of four months was reported to be the reason for the contract. This is said to be the first time that the steel framework for an American office building will be of foreign origin.

COST TOLERANCES — "The estimating department and the engineering staff are now the big boys in a construction firm." So says Mr. S. Feldman, secretary of Malan Construction Co., in discussing the increasing severity of competition for heavy construction jobs. He cites as an example a $600,000 project for which bids had a spread of only $140. Cost reductions, he adds, are achieved in many ways, none of which is particularly spectacular, but proper engineering in the office and a careful analysis of the job itself nearly always enable costs to be reduced below original estimates.

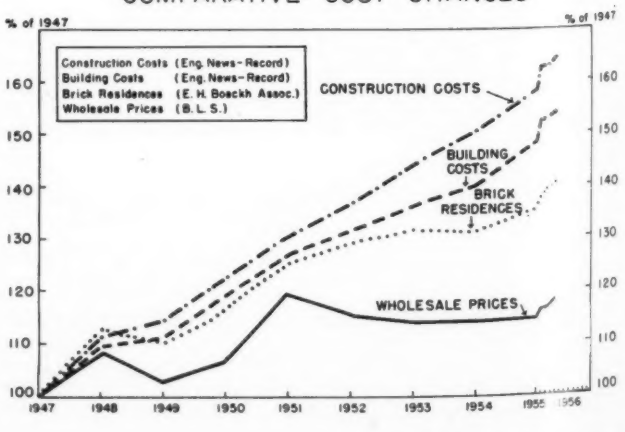
TWO-IN-ONE — The Port of N. Y. Authority has polled the public on a new angle on the parking problem. A plan has been devised whereby a 1000-car parking lot may be constructed on top of a new $16 million pier to be built in lower Manhattan. Revenues from the operation of the parking facility would make a helpful contribution to covering the cost of the whole structure. A questionnaire will disclose public reaction to the idea.

PUBLIC WORKS — To correct present deficiencies and to provide for increasing consumption, investment in public water supply systems must be increased from $22.8 billion, as currently estimated, to $35.7 billion by 1975. A recent report by the Water and Sewerage Industrial and Utilities Division of the Department of Commerce adds that $6 billion more will have to be spent in this period for maintenance and replacement.

CONSTRUCTION EDUCATION — How to provide future executives of the construction industry with special courses in college that will equip them with administrative training, was the problem "rassled" with by some 1100 engineering contractors and educators at the first Summer School on Construction Education held at Iowa State College. It was agreed that engineering curricula should include introductory and elective courses in construction and management and that contractors and schools should assume joint responsibility for getting and paying properly trained instructors in construction courses in colleges.

WARNING SIGNS? — The importance of an industry like construction which reaches practically every corner of the economy doesn't need to be labored, but it does need to be constantly kept in mind. Anything that clogs this form of investment is seriously detrimental to the whole economy. The trend of building and construction costs is, therefore, of importance at any time but particularly now in view of the high level of industrial and commercial building and the huge highway construction program getting under way. Some analysts find warning signs in the accompanying chart.

COMPARATIVE COST CHANGES



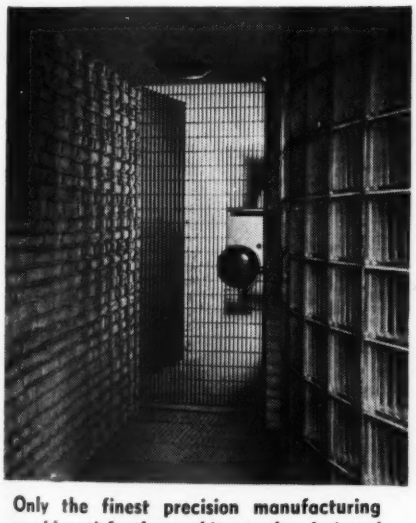
BORDEN *first* IN FLOOR GRATING

USES OF GRATING . . . WHERE ONLY BORDEN QUALITY WOULD DO . . .

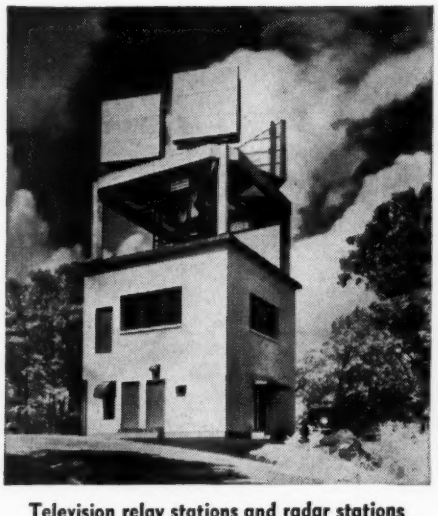
Here on this page are a few of the many new or unusual uses for grating being pioneered every day. Each is an exacting job where only standards of quality equal to BORDEN'S will do.

And remember . . . BORDEN manufactures every type grating in ferrous and non-ferrous metals.

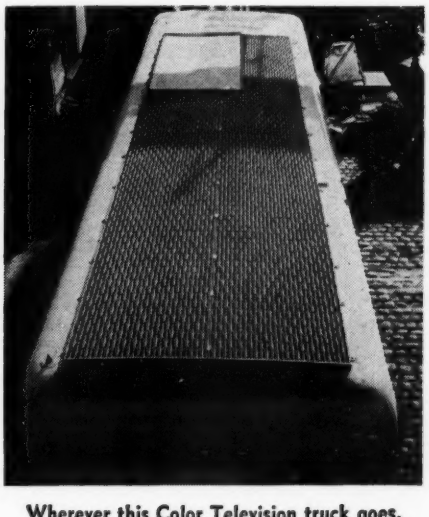
ON THE MERRITT PARKWAY . . . The recently installed Borden Roadway Grating shown here helps solve a drainage problem. Over 80% open, these Borden gratings give years of durable, minimum-maintenance service. And remember, SPECIFY BORDEN and you specify the best.



Only the finest precision manufacturing would satisfy the architect who designed this door. BORDEN is recognized as a leader in quality, custom-manufactured gratings.



Television relay stations and radar stations that gird our continent have adopted grating as standard outside platform material. It will not collect snow as most other platforms will.



Wherever this Color Television truck goes, whatever the assignment of the reporters who must mount its roof, Borden riveted *serra-crimp* grating will mean surerfooting —even in ice or snow.

BORDEN METAL PRODUCTS CO.

Gentlemen:

Please send me BORDEN Catalog

NAME .....

TITLE .....

COMPANY NAME .....

ST. AND NO. .....

CITY AND STATE .....

See our catalog in Sweets

Write for complete information on BORDEN All/Weld, Pressure Locked, and Riveted Floor Gratings in this FREE 8-page catalog

BORDEN METAL PRODUCTS CO.

817 GREEN LANE Elizabeth 2-6410 ELIZABETH, N. J.
SOUTHERN PLANT—LEEDS, ALA. — MAIN PLANT—UNION, N. J.

This One is 100% Efficient on Chickens – but 0% on Mice!

SO – when you compare filter efficiencies, use the same test

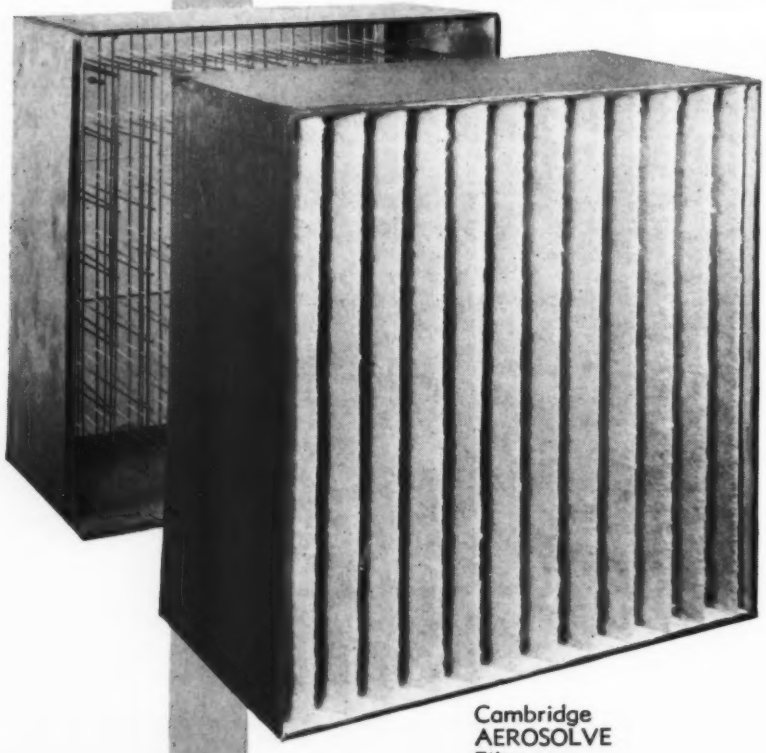
STANDARD TESTS — PERCENTAGE OF EFFICIENCY

TYPE FILTER	ASHVE (Weight Test)	NBS TEST # (Atmospheric Dust)	DOP TEST (0.3 Micron Smoke)
Cambridge Absolute	*	*	**99.95 Min.
Cambridge Aerosolve 95	*	90-95	80-85
Cambridge Aerosolve 85	99	80-85	50-60
Cambridge Aerosolve 35	96	30-35	20-30
Electric Precipitator	99	85-90	60-70
2" Cleanable	76	8-12	2-5
2" Throwaway	76	8-12	2-5

*Practically 100%. Test not practical for more accurate reading.

#National Bureau of Standards Discoloration Test.

**Maximum Allowable Penetration of Dioctyl Phthalate Smoke 0.05%. Every filter individually tested.



Cambridge AEROSOLVE Filter

Cambridge filters, used alone or with pre-filters to take out the "chickens," give you high-efficiency air cleaning at only a fraction of previous costs. Wide range of efficiencies, from the Cambridge AEROSOLVE 35 to the world-famous Cambridge ABSOLUTE.

Cambridge AEROSOLVE Filters have a rugged permanent frame for long life. Light, compact cartridges, in a wide range of efficiencies, provide long service life and are easily replaced. No maintenance required.

Take advantage of Cambridge's unequalled experience in the field of high-efficiency air filtering. Ask the Cambridge man to help you lick your tough filtering problems.

Write for
AEROSOLVE Filter Bulletin 105A
ABSOLUTE Filter Bulletin 106A

CAMBRIDGE FILTER CORP.

Pioneers in High-Efficiency Air Cleaning

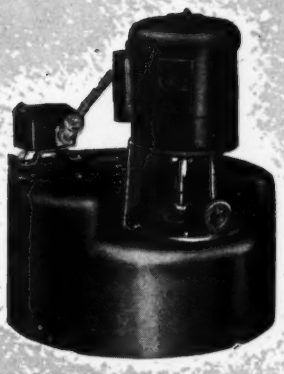
730 E. Erie Blvd. Syracuse 3, N. Y.

Representatives in Principal Cities

SKIDMORE PUMPS have set a standard for performance and dependability since 1921

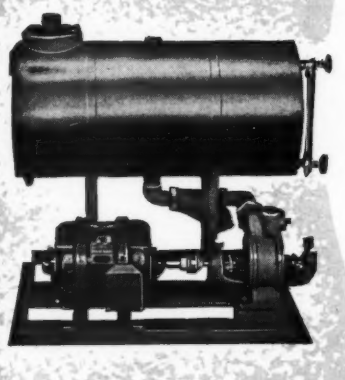
SPECIFY WITH CONFIDENCE

There's a Skidmore Pump designed for each and every heating requirement.
Write for bulletins



TYPE "CVS"

New, wider range of discharge pressures—from 10 to 40 lbs. Capacities range from 500 to 10,000 sq. ft. E.D.R.

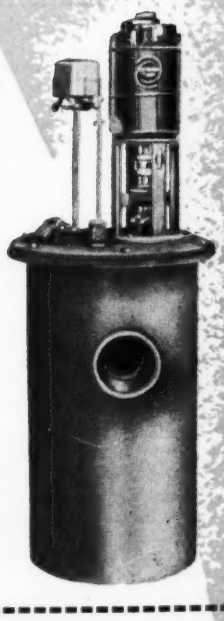


TYPE "TM"

Completely assembled on either steel or cast iron base —capacities, for boilers up to 250 H.P., with discharge pressures to 150 lbs.

TYPE "HS"

Sturdily constructed for dependable service at small investment—capacities, 1,000 to 65,000 sq. ft. E.D.R., discharge pressures from 10 to 75 lbs.



VACUUM TYPE

Automatically adjusts itself to the varying conditions of the system. Efficiency maintained. Capacities ranging from 5,000 to 100,000 sq. ft. E.D.R.

TYPE "UV"

Designed for low return installations — capacities, 2,000 to 40,000 sq. ft. E.D.R. and discharge pressures from 10 to 75 lbs.

Send Coupon For Bulletins

SKIDMORE CORPORATION

ST. JOSEPH, MICH.

SKIDMORE CORPORATION, ST. JOSEPH, MICHIGAN

Please send bulletins on the following pumps checked below.

CVS TM HS UV VACUUM

Name .....

Firm .....

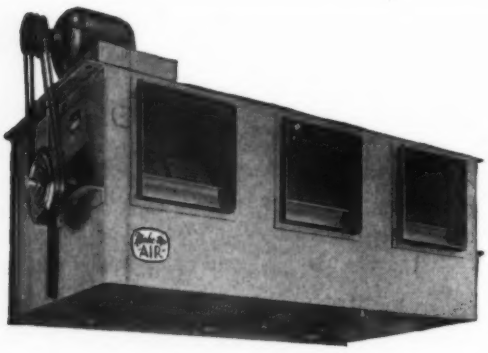
Address .....

City ..... **State**.....

ATOMS IN ACTION

THE JOINT CONGRESSIONAL COMMITTEE on Atomic Energy has reported out favorably a bill designed to provide government indemnification of reactor operators and others who might be found liable for damage claims in the event of a reactor accident. The bill, S.4112, a revised draft of the bill introduced in the Senate by Joint Committee Chairman Clinton P. Anderson, would require the AEC to determine the exact amount of financial protection each of its licensees must have. This amount would be required as a condition for licensing by AEC and could include private insurance and contractual indemnities, self-insurance, other proof of financial responsibility, or a combination of such measures. Beyond this amount, the government would indemnify each reactor operator for a sum up to $500 million. The "others" covered in the bill include contractors, designers and constructors of the reactor, and manufacturers whose products are used in the design.

FOUR POWER BILATERALS have been sent by the AEC to The Joint Committee on Atomic Energy—just in time to allow the 30 day waiting period while Congress is still in session. Three of the agreements—with Australia, the Netherlands, and Switzerland—involve exchange of classified information and export from the U.S. of uranium containing up to 500 kg of U-235. The agreement with France involves only the exchange of unclassified information and export of uranium containing up to 40 kg of



New York Blower products are skillfully engineered, accurately rated, have a nation-wide reputation for dependable performance. They are laboratory tested and fully guaranteed in strict accordance with Standard Test Codes.

CORRECT AIR STARVATION

AND BALANCE MINUS PRESSURE

WITH *nyb* Make-Up AIR

to safeguard health, bring comfort to workers, reduce absenteeism and increase efficiency.

Where gases, dust and fumes are removed in large volume with exhaust fans, depleting the air supply within the building, and creating a minus pressure, we recommend the installation of our Make-Up Air units.

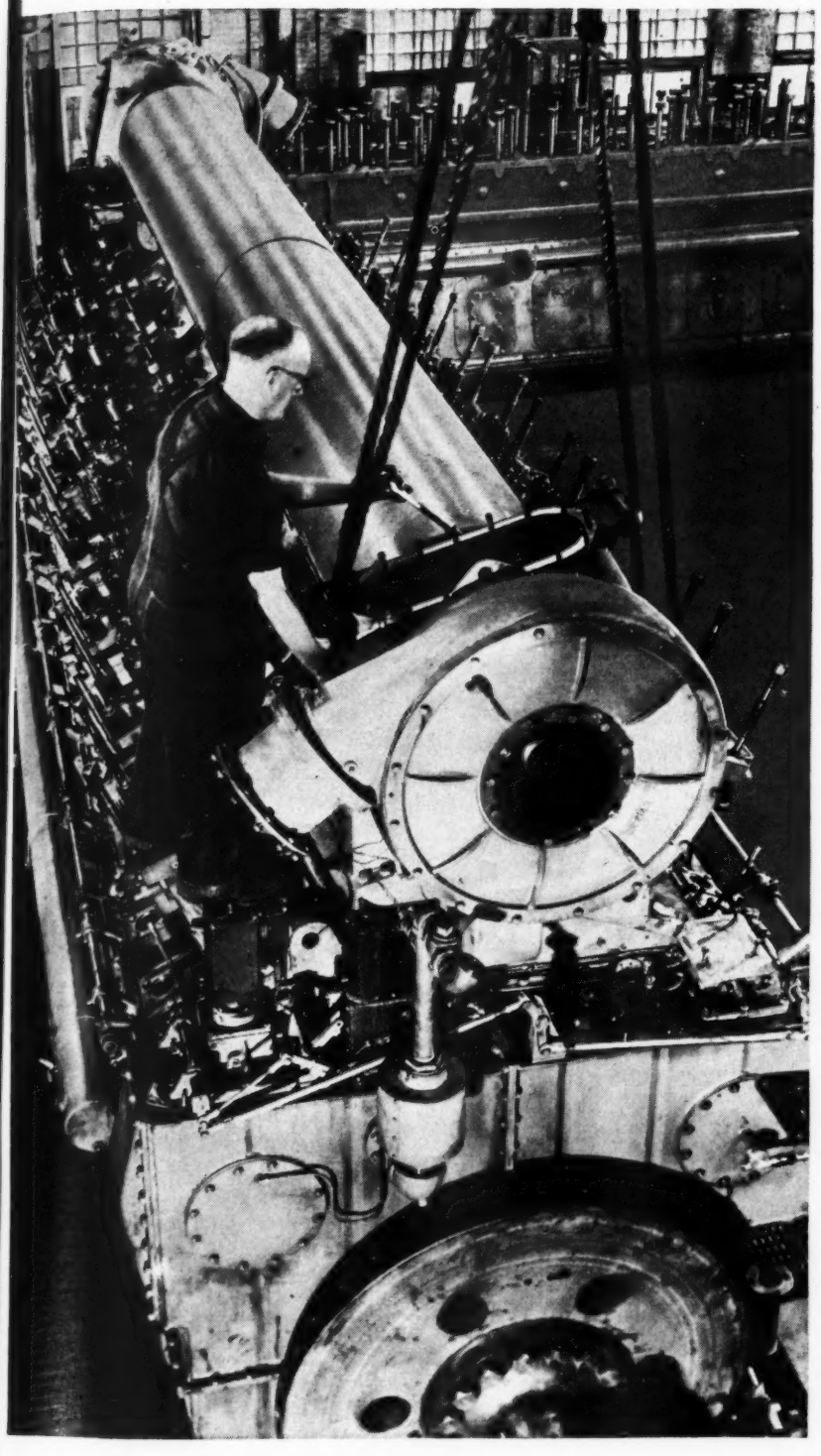
These simple, compact, ceiling suspended units replace the air from the outside, in an even and constant flow, without drafts or noise; warmed, cleaned and delivered in definite known quantities to balance the known loss. Correct drafty conditions and uncontrolled infiltration. Furnished in 4 sizes from 5,000 cfm to 20,000 cfm.

Write for Bulletin 523.

nyb THE NEW YORK BLOWER COMPANY

SALES OFFICES • 3145 SOUTH SHIELDS AVENUE • CHICAGO 16

FACTORY, LAPORTE, INDIANA



NOW...

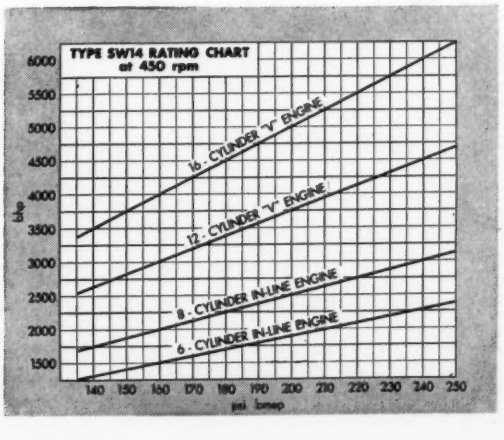
America's first big diesel built to take full advantage of turbocharging

America's first diesel designed and built for turbocharged operation up to 5,000 hp has been hailed as the greatest power engine advance in over twenty years. Fourteen engines on order in its first production year prove unusual user acceptance. Some important reasons for this success are massive component design, compact construction for lower foundation and installation costs, and continuous high power operation on the most economical, locally available fuels.

Worthington's SW 14 offers you performance ratings that are conservative by *any* standard. You can only get this degree of reliability in a turbocharged engine when it's designed specifically for high cylinder pressures under continuous heavy duty operation. A "souped-up" engine just doesn't meet SW 14 standards.

It's as easy as calling your nearest Worthington Office to get the whole story on the SW 14, or write Worthington Corporation, Section E61, Harrison, New Jersey, for Bulletin S-500-B60.

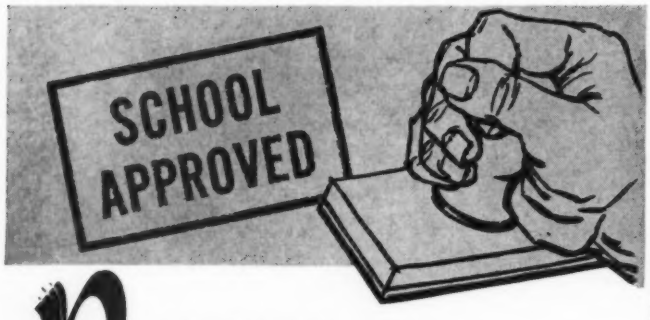
E.6.1



WORTHINGTON

ECONOMICAL, CONTINUOUS POWER

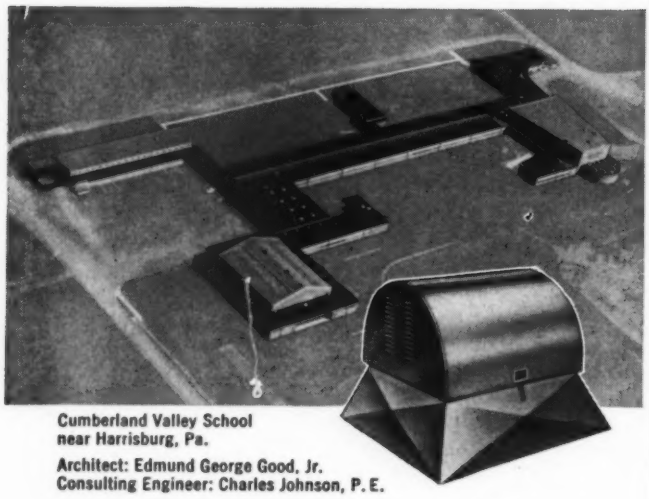
Diesel, Dual-Fuel and Spark-Ignition Engines from 150 to 5000 BHP



SPECIFIED AGAIN . .

PENN VENTILATORS

make school ventilation problems elementary



Cumberland Valley School
near Harrisburg, Pa.

Architect: Edmund George Good, Jr.
Consulting Engineer: Charles Johnson, P. E.

Penn Ventilators have been used for the ventilation of countless schools. Design problems become easy as ABC when these versatile quiet exhausters are incorporated with interior duct systems . . or for general spot ventilation.

Penn Ventilators are styled low and attractively blend with modern architecture. The Penn Ventilator man in your area has complete details . . you would do well to contact him soon.

Penn's 3 R's of Ventilation . . .
Results and Reliability through Research

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PHILADELPHIA 40, PA.

Representatives and Distributors in Principal Cities
Member of the Power Fan Manufacturers Association

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U-235. This brings to seven the number of power bilaterals. The other three are with the United Kingdom, Canada and Belgium.

THE LUMMUS CO. has received AEC authorization to use classified information for engineering and design service to Lummus Co. Ltd. and the United Kingdom in conjunction with a general study of power reactors to be conducted in England with a group of English engineers headed by Richardsons, Westgarth & Co., Ltd. The study is under the auspices of the UK Atomic Energy Establishment in Harwell.

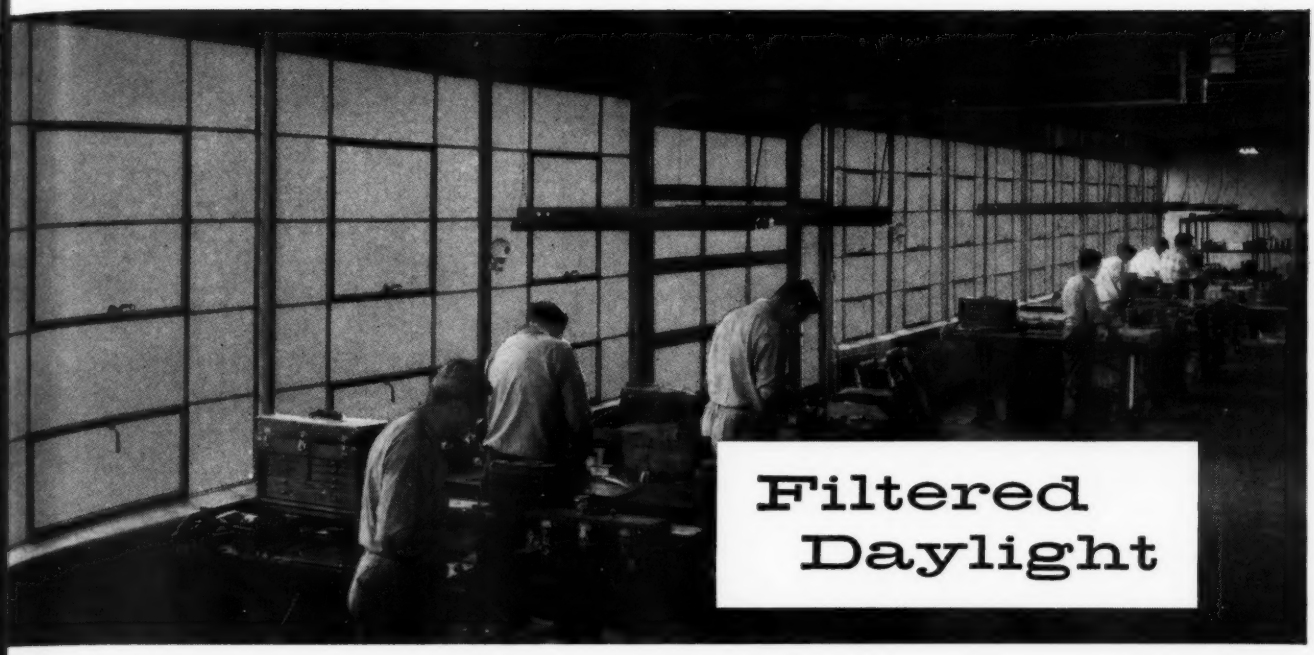
MANAGING DIRECTOR of the Icelandic National Research Council, Dr. Thorbjoern Sigurgeirsson, estimates that a $20 million plant operated by geothermal steam sources on the island could produce 100 tons of heavy water a year.

KAISER ENGINEERS has signed a contract with the Navy to undertake an engineering study on radioactive waste control at the U.S. Naval Radiological Defense Laboratory in San Francisco. The study will evaluate alternate methods of control and disposal of radioactive liquid and gas effluent from research operations to be carried on at the laboratory.

DIRECT GENERATION of electricity without the necessity of going through a heat cycle may be possible with the fusion reaction, according to Dr. Amasa Bishop, chief of the Controlled Thermonuclear Branch of AEC's Research Division. Speaking before the Denver meeting sponsored by The Atomic Industrial Forum and Denver Research Institute, he pointed out, however, that the so-called "ignition temperature," at which the reaction can overcome energy radiation losses and become self-sustaining, is somewhere near 400 million degrees centigrade.

THREE U.S. FIRMS have sold swimming-pool-type research reactors abroad in the last month. The Netherland Reactor Center purchased a 10-20,000 thermal kw reactor from ACF Industries, Inc. A 1000 thermal kw American Machine & Foundry reactor will go to the Technische Hochschule in Munich, West Germany, and Foster Wheeler Corp. sold a $1.4 million reactor to the Danish Atomic Energy Commission for construction at a new research center to be built at Roskilde, near Copenhagen. West German Atomic Energy Minister Franz Josef Strauss, during his visit to the U.S. in June, is reported to have arranged for the purchase of two more research reactors: a 1000 thermal kw swimming-pool from Babcock and Wilcox, for construction at Hamburg; and a water-boiler from North American Aviation, to be placed at Frankfurt.

MATHEMATICAL EQUATIONS of reactor kinetics, worked out at the Atomic Power Division of Westinghouse Electric Corp., indicate that water-moderated reactors have a built-in stability that will prevent runaway even if all safety devices fail to function. The equations predict that as the temperature of the water in the reactor rises, the fluid expands so much that too few neutrons remain in the core to sustain a chain reaction. This inherent stability is a characteristic of the pressurized-water reactor, the boiling-water reactor, and homogenous reactors that use a water moderator. Dr. A. F. Henry, of Westinghouse, speaking before the American Nuclear Society, stated that this finding indicates that in the future reactors might operate with steam control rods that allow the extra neutrons to "leak" from the core. ▲▲



relieves eye strain and body discomfort

Frosted *Aklo*® Glass softens and diffuses transmitted daylight, reduces glare of direct sun, bright sky and dazzling reflections. Its subdued blue-green color is restful to the eyes.

Aklo Glass reduces solar heat. It absorbs sun heat as the light passes through, reradiating much of the heat back outdoors. *Aklo* Glass in ¼" thickness shuts out as much as 44% of the sun's radiant heat energy. Its blue-green color even makes you feel cooler.

Phone your L·O·F Glass Distributor or Dealer for a radiometer demonstration to show you how *Aklo* Glass reduces glare and heat. He is listed under "Glass" in the yellow pages of your phone book. Or write to Libbey·Owens·Ford Glass Company, 608 Madison Avenue, Toledo 3, Ohio.

AKLO GLASS — **FILTERS DAYLIGHT**

BLUE RIDGE GLASS CORP.®

made by Blue Ridge Glass Corp.
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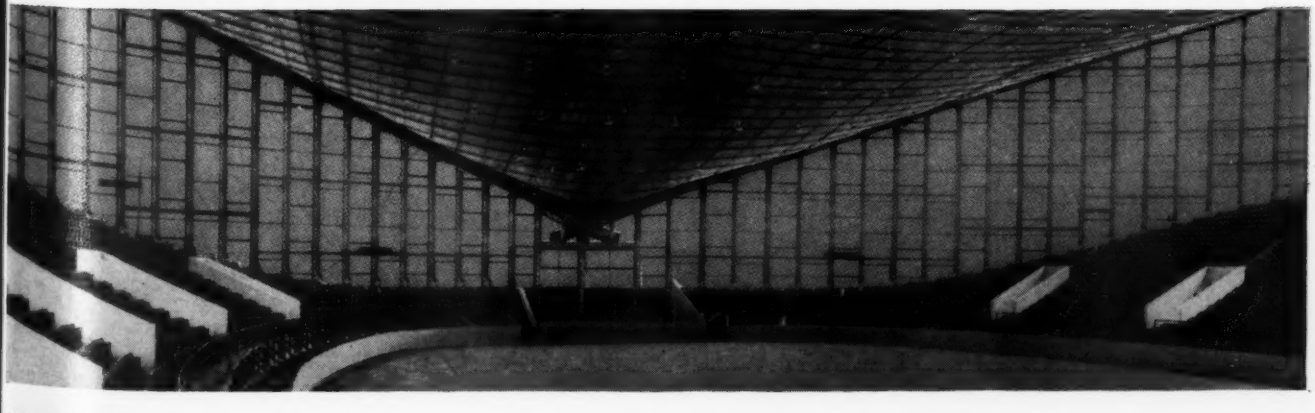
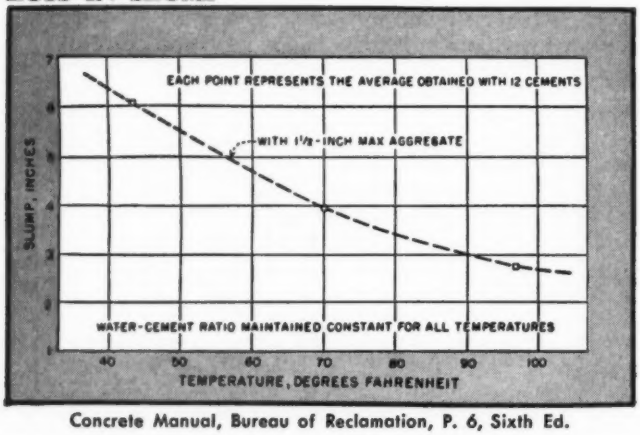
L·O·F GLASS®



Why Should HOT WEATHER CONCRETE Concern You?

... because HOT WEATHER CONCRETE sets more quickly, has lower ultimate strength, cracks more, and requires more mixing water than concrete made at cooler temperatures. In addition to structural deficiencies, HOT WEATHER poses problems with placing, compacting, and finishing.

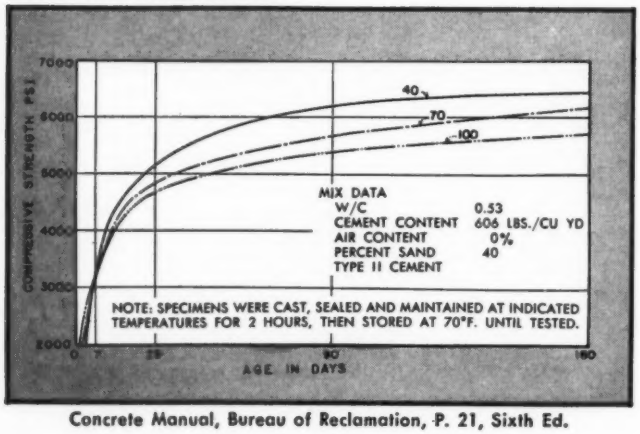
LOSS IN SLUMP



Concrete Manual, Bureau of Reclamation, P. 6, Sixth Ed.

This graph illustrates the loss in slump due to hot weather. Notice the 4" loss between 40°F and 100°F. Normally this loss in slump is overcome by adding more water to the mix. The result – more cracking and lower ultimate strength.

LOSS IN STRENGTH



Concrete Manual, Bureau of Reclamation, P. 21, Sixth Ed.

Even when no extra water is added to concrete in hot weather, strength will go down. Notice the 800 psi loss in strength at ninety days between concrete at 40°F and 100°F.

WHY TEMPERATURE AFFECTS CONCRETE

A cement gel forms around each grain of cement in the initial stage of mixing. The gel is large in hot weather and relatively small in cold weather. A large gel requires more water. Thus, the gel size governs the water requirement and ultimate quality. Gel size can be controlled . . . physically, by cooling the mix with ice... chemically, by controlling the mix with an exclusive gel-reducing agent . . . PLASTIMENT.

RETARDED SET – When the cement gel is reduced in size chemically, the setting time will be retarded in proportion to the quantity of Plastiment which is added. Thus a simple specification based on temperature and varying quantities of Plastiment will provide for uniform setting time and water requirement at all job temperatures. This chemical control will result in the high ultimate strength and reduced cracking that is obtained with cooled concrete.

BLEEDING ACTION—With the chemically controlled cement gel there is a unique type of bleeding action. Field men will notice a rapid release of clean, clear mixing water without scum or laitance after the concrete has been placed. In a wet mix this effect is very noticeable and serves as a "safety valve" by releasing the excess water and thus lowering the water cement ratio of the concrete in place.

PLASTIMENT ACTION – Plastiment's action is uniform and predictable. It may be added as a powder or liquid to an established mix or included in the original mix design. It does not entrain air and so may be added in variable quantities to suit the job conditions. Plastiment works only on the cement gel and therefore may be used in any type of plain or air entrained concrete.

CONCLUSION

Hot weather concrete can be controlled chemically to give uniform high quality and normal setting time through the use of varying proportions of Plastiment. Write today for Sika's *all-temperature concrete specification.*

Sika®

PLASTIMENT® CONCRETE DENSIFIER

SIKA Chemical Corporation, Passaic, New Jersey

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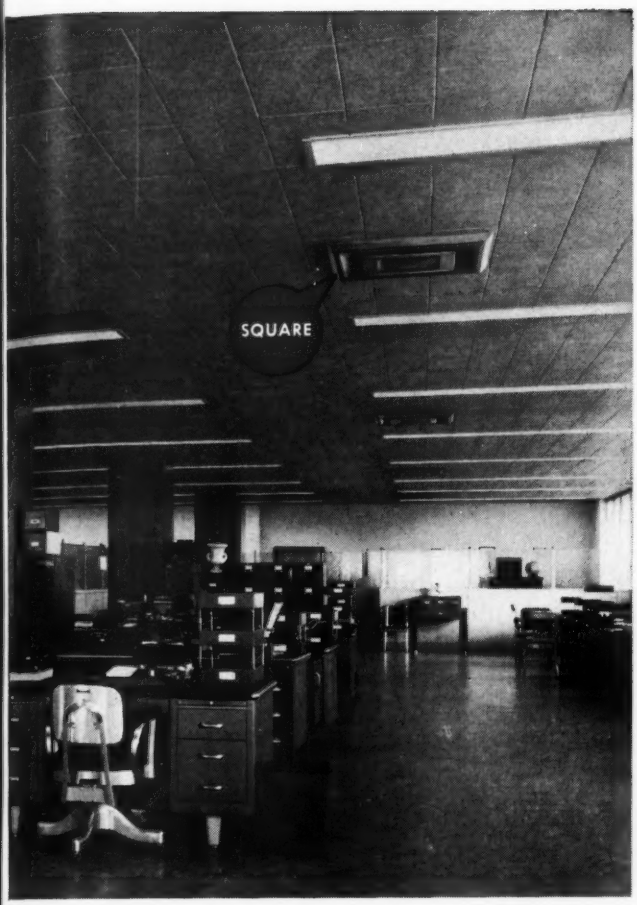

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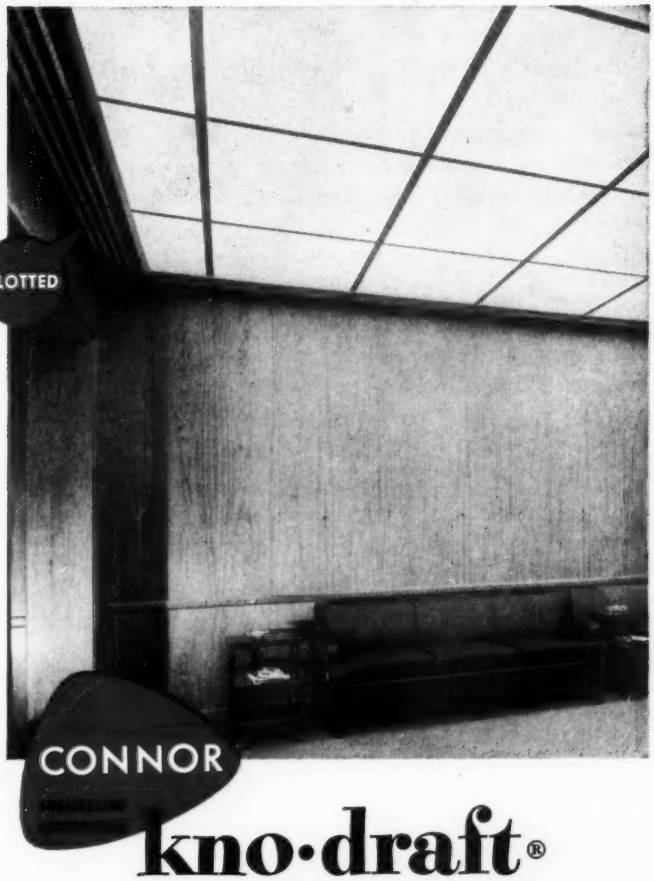
Square and Slotted Series Air Diffusers



Architects and engineers now have wide new latitude in selecting air conditioning outlets. The addition of this "Architects' Group" of square and slotted units to the famous line of round Kno-Draft Air Diffusers offers the industry's most complete line of engineered diffusers.

Kno-Draft Square Diffusers (Series KP): Two models, eight sizes. Neck diameters from 4 to 14 inches. Capacities from 50 to 1250 cfm. Sturdy pressed steel construction. Available, with or without patented sleeve damper or anti-smudge frame, for overlap installation in acoustical or plastered ceilings; or snap-in installation in T-bar ceilings. All units geometrically proportional so that, at constant neck velocities, static pressure is same for all sizes. Precise, *circular* diffusion patterns over large area assured.

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The Legal Aspect

MELVIN NORD, P.E.
Consultant in Legal and Technical Problems
Patent Attorney

Engineering Registration

Each state in the Union, plus Hawaii, Alaska, the District of Columbia, and Puerto Rico, now has a statute requiring the registration of engineers. The statutes vary from state to state, but are generally similar to each other. It is our purpose in this and succeeding columns to analyze the similarities and difference between these statutes.

Mixed Registration Laws

In most states, a single statute provides for the registration not only of engineers, but also of architects and/or land surveyors. In 18 of the 52 jurisdictions mentioned above professional engineers alone are registered. In 5 jurisdictions engineers and architects are included, in 22 engineers and land surveyors, and in 7 engineers, architects, and land surveyors.

The principal advantage of joining two or more of these fields in the same statute seems to be that it gives a single board the power and duty to regulate related professions, eliminating unnecessary duplication and expense.

Purpose of the Law

Many engineers misinterpret the object of registration laws and duties of registration boards. The object of the law is not to aid engineers or the engineering profession by excluding competition, increasing salaries, or increasing social prestige. If these were the objectives, the statutes would all be unconstitutional, since the state has no right to injure one group of people (unlicensed engineers) simply for the private benefit of another group (engineers who wish to be and are able to be licensed).

The object of the registration laws is to protect the public health, safety, and welfare. Every state has the power to make reasonable regulations to protect the public health, safety, welfare, or morals. It is known as the "police power." The Federal Government has no police power over activities within a state. Its police power is limited to Federal territories and possessions. As a result, there are no prospects whatever for achieving uniformity in the registration laws throughout the country by means of Federal enactment. We have 52 individual laws and we are not going to be able to reduce them to one law. However, in a few other fields uniformity of the law has been reached or approached by the promulgation by interested groups of Uniform Laws. If these groups have sufficient prestige, the proposed Uniform Laws are eventually enacted by the legislatures of most or all states, thereby approaching uniformity of the law. Thus far, the most successful of such laws is the Negotiable Instruments Law. This law was proposed in 1896 by a Committee of the National Conference of Commissioners on Uniform State Laws, and by 1924 had been adopted in every state. The Uniform Sales Act is the next most successful uniform law, having been adopted in about three-quarters of the states of the Union.

Prospects for Uniformity

The prospects of obtaining uniformity in the law governing registration of engineers is very small. The Federal government cannot do it, and it is extremely difficult (approaching impossibility) to induce the legislature of each state to adopt identical laws.

In this field and in many others, the most promising and realistic approach is for interested groups (e.g. the National Society of Professional Engineers) to promote a well thought out model law and try to induce legislatures to copy it as closely as possible.

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In any cyclone dust collector there is an upward eddy preventing the separation and dropping-out of a percentage of particles. But in Buell Cyclones, the exclusive Buell shave-off design *harnesses* this up-flow—puts it to work! Result: extra efficiency without extra operating cost!

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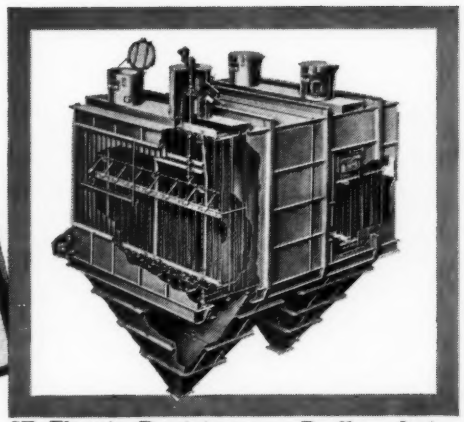

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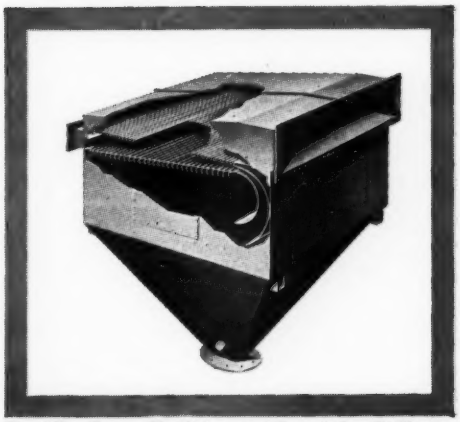

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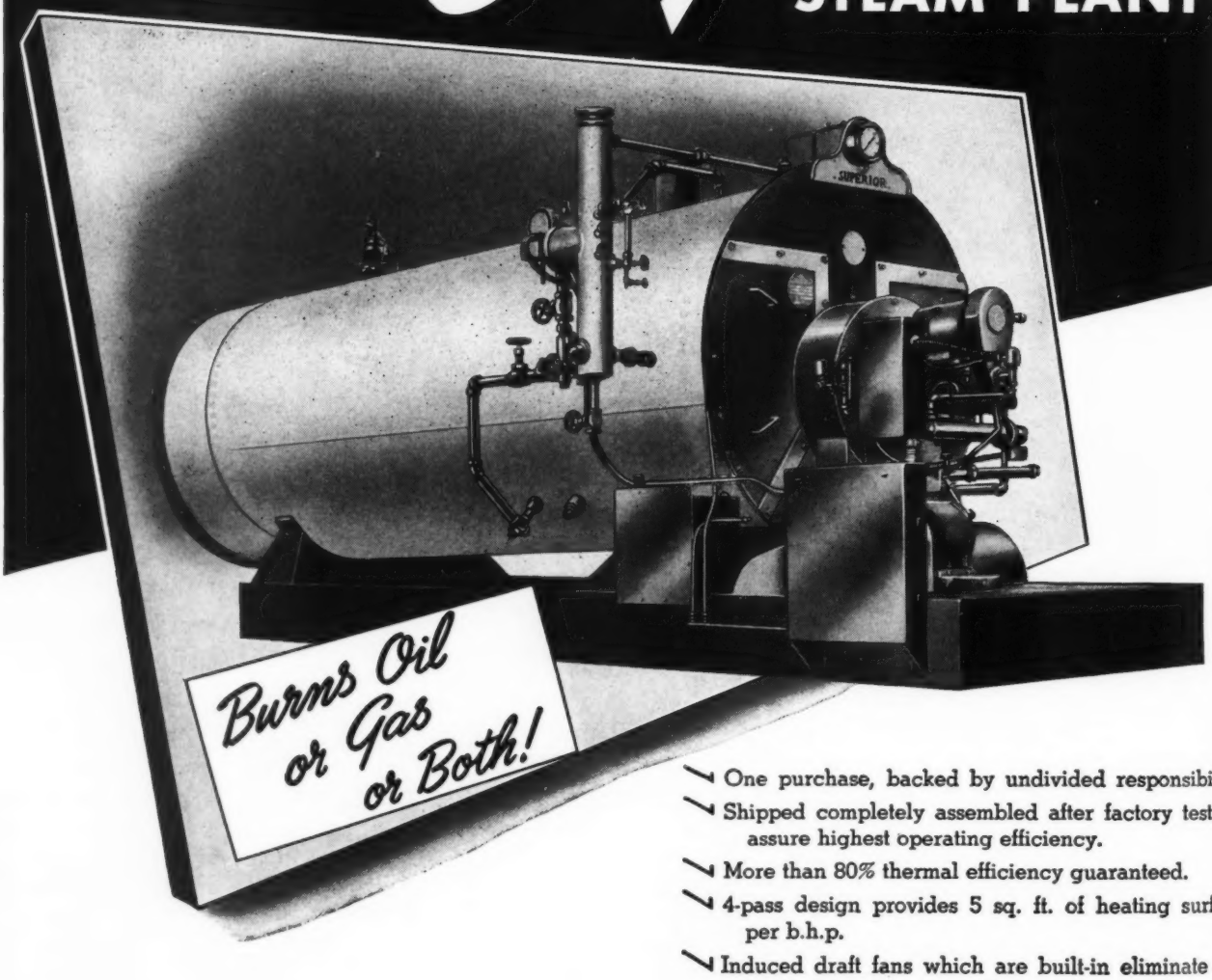

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At the present time, most registration laws have been copied largely from each other, but there is considerable room for increased uniformity and for general improvement of the laws.

Who Must be Registered?

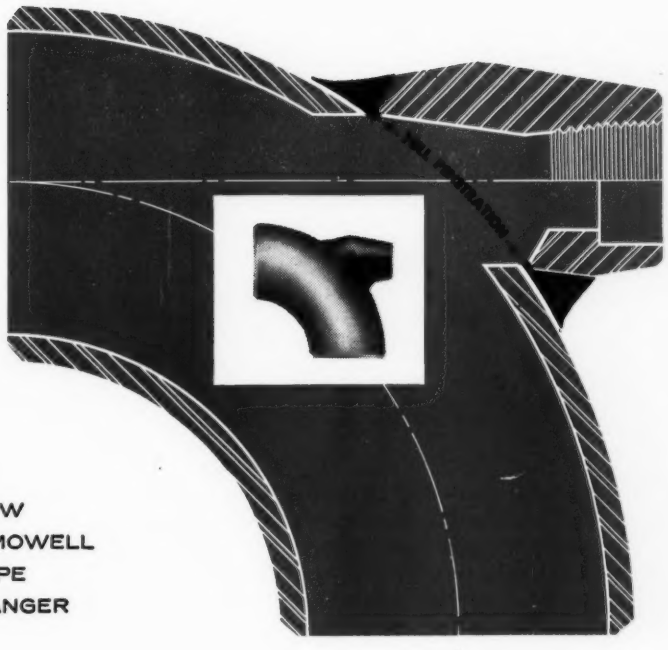
A typical provision of the registration laws reads as follows: "In order to safeguard life, health, and property, any person practicing or offering to practice the profession of architecture, profession of engineering or of land surveying, shall hereafter be required to submit evidence that he is qualified so to practice and shall be registered as hereinafter provided; and it shall be unlawful for any person to practice or to offer to practice the profession of architecture, the profession of engineering or land surveying, in this state, or to use in connection with his name or otherwise assume, use, or advertise any title or description tending to convey the impression that he is an architect, a professional engineer, or a land surveyor, unless such person has been duly registered or exempted under the provisions of this act.

Thus, anyone practicing or offering to practice the "profession of engineering" or conveying the impression that he is a "professional engineer" must be registered or exempted.

Definitions

The definition of a professional engineer is generally given as . . . "a person who, by reason of his knowledge of mathematics, the physical sciences, and the principles of engineering, acquired by professional education and practical experience, is qualified to engage in engineering practice."

This definition tells us that a professional engineer is a person who is qualified to engage in engineering practice. Presumably this means the practice of professional engineering. Thus, any person who is qualified by proper knowledge, education, and experience to engage in engineering practice is, by definition, a professional engineer. However, as pointed out above, the law says that anyone who conveys the impression that



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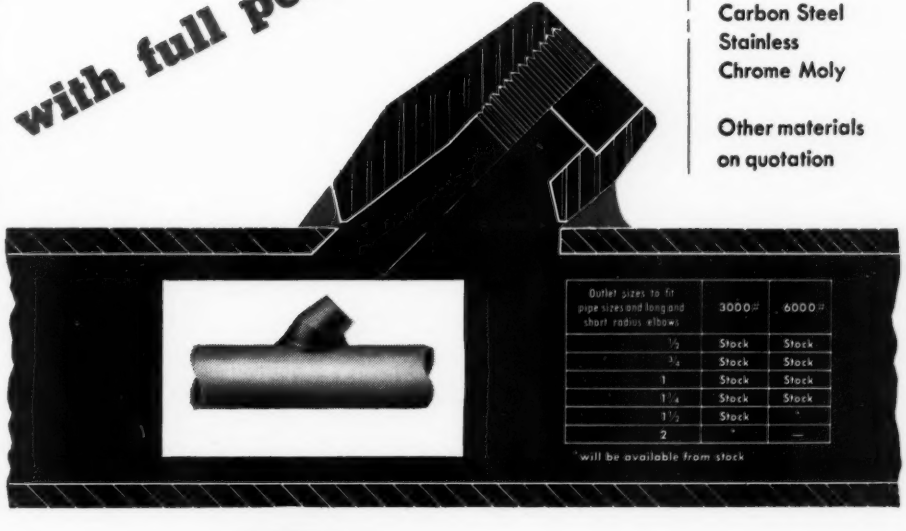

Outlet sizes to fit pipe sizes and long and short radius elbows	3000#	6000#
½	Stock	Stock
¾	Stock	Stock
1	Stock	Stock
1¼	Stock	Stock
1½	Stock	*
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STRIKING ADVANCE IN MATERIALS CONVEYING WILL BRING NEW EFFICIENCY, SPEED, SAFETY TO YOUR OPERATIONS!

Things are moving in the materials handling field. Especially since the development of the double-damper valve. This valve already has multiple applications, and fresh ones are being discovered all the time. Some plants use the valve to feed dry materials *into* a conveying system; in other plants it discharges materials *from* a system. All materials passing through the valve are delivered in uniform, measured batches.

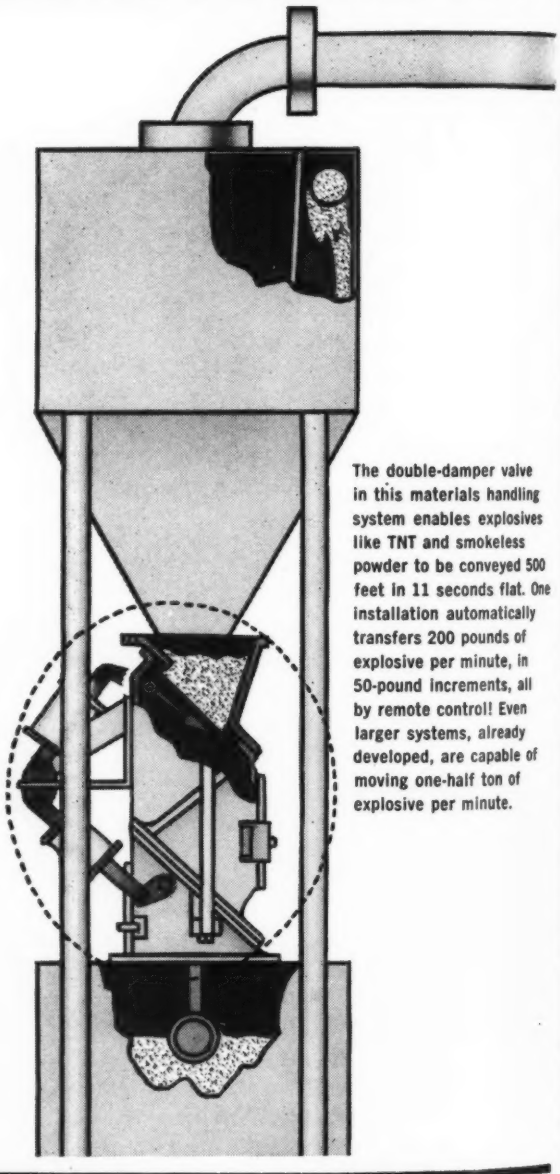
Air appliance engineers had been striving for years to perfect a valve of this kind, which would constitute an effective air-lock between the high-pressure differential inside a pneumatic conveying system and the atmospheric pressure outside. Now they have succeeded. And the number of purposes to which the valve can be put in industrial conveying is enormous.

The double-damper valve represents a new concept in fast, accurate, *safe* conveying. It is now possible—in fact, simple — to move materials that are explosive, fire-hazards or a menace to health, as well as inert materials, because there is no concentration of material and the valve's live rubber seats avoid friction and wear.

The double-damper valve is part of a Hoffman engineered system, another instance of how Hoffman's ingenuity is helping industry achieve the higher standards of safety and efficiency that mean higher output.

Yes, things are moving in the materials handling field, and Hoffman's engineered systems are moving them! Would a materials conveying system speed up operations . . . avoid danger and wastage . . . increase capacity . . . in plants designed by you?

If you think so, or even if you aren't sure, write or call Hoffman, and learn how our engineers will work with you from design through installation of every system.



The double-damper valve in this materials handling system enables explosives like TNT and smokeless powder to be conveyed 500 feet in 11 seconds flat. One installation automatically transfers 200 pounds of explosive per minute, in 50-pound increments, all by remote control! Even larger systems, already developed, are capable of moving one-half ton of explosive per minute.

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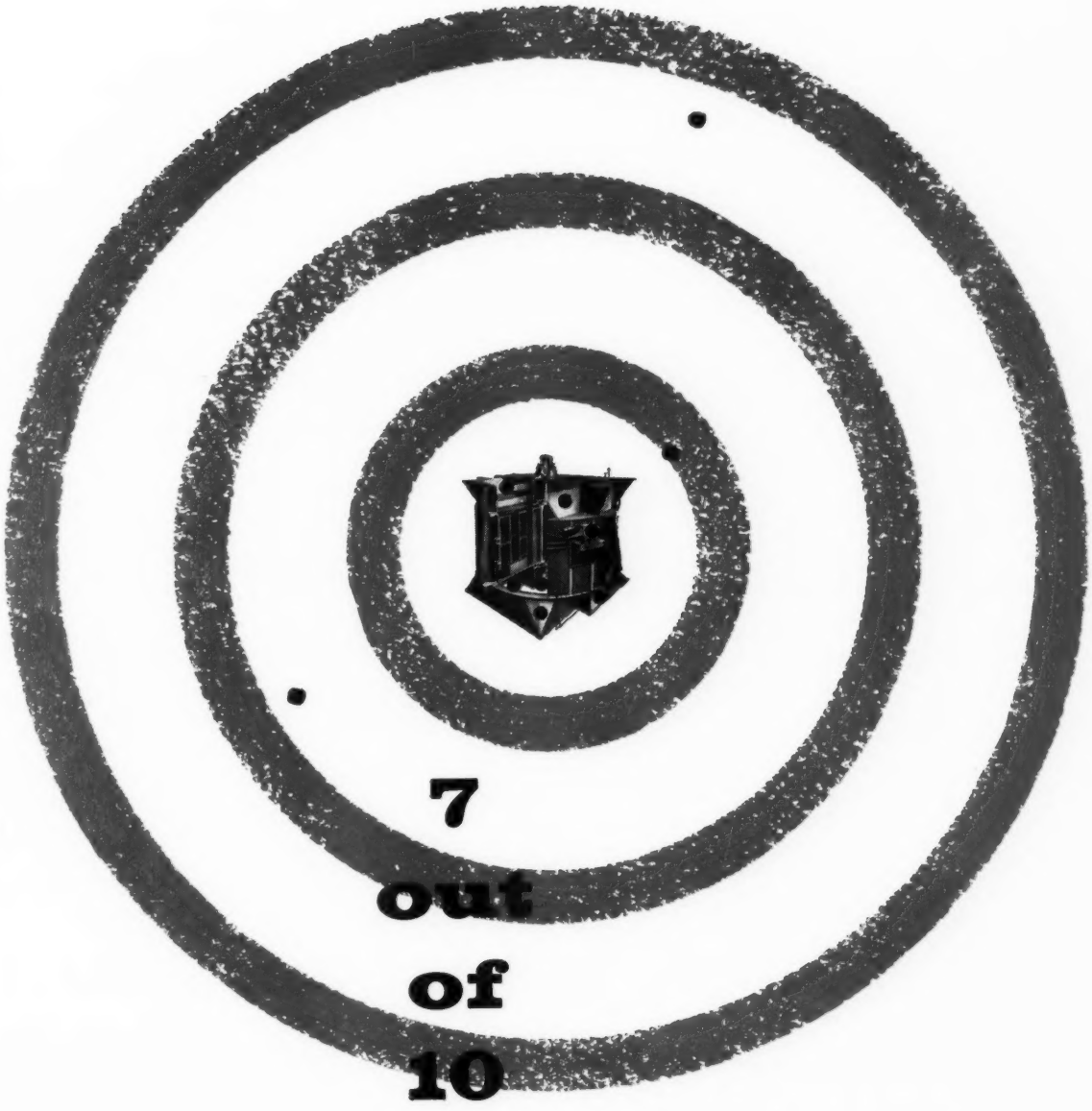
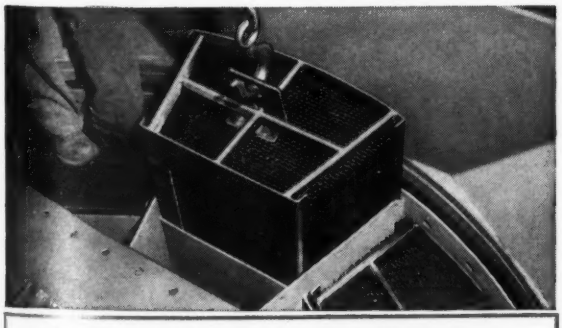


air preheater installations are Ljungstrom®



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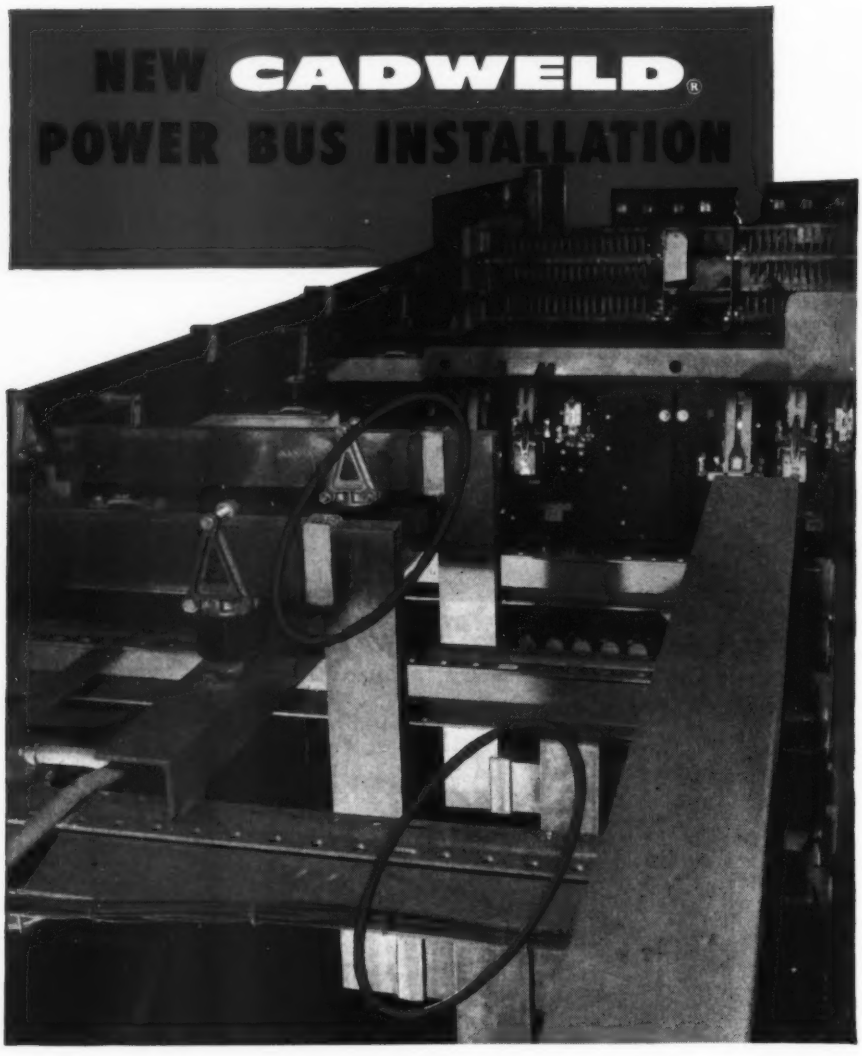

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he is a professional engineer must be registered or exempted.

The difficulty here is with the definition of professional engineer. A professional engineer should be defined simply as a person who engages in the practice of professional engineering and is legally qualified to do so by registration or exemption under the statute. No one who is not registered or exempted would then have the right to convey the impression that he is a professional engineer.

In addition, the definition of the term "professional engineer" quoted above is faulty because there is no absolute requirement in the statutes that a person must have a professional education in order to become registered as a professional engineer, and yet that is what the definition implies.

As a result, there is considerable room for improvement in the definition of the term. Further, it obviously stands or falls on the accuracy of the term "practice of professional engineering." If the latter term is ambiguous so is the former, since the practice of professional engineering is what the professional engineer engages in.

A typical definition of "the practice of engineering" in the statutes is the following: "Any professional service, such as consultation, investigation, evaluation, planning, design, or supervision of construction, in connection with any public or private utilities, structures, buildings, machines, equipment, processes, works, or projects, wherein the public welfare or the safeguarding of life, health, or property is concerned or involved, when such professional service requires the application of engineering principles and data."

This definition suffers from a number of grievous defects, not the least of which is improper punctuation. The question may properly be asked whether "the public welfare or the safeguarding of life, health or property" refers to the term "any professional service" or only to the list of illustrations starting with the words "such as" and ending with "or projects." Thus, if one omits the illustrative examples, is the definition supposed to read this

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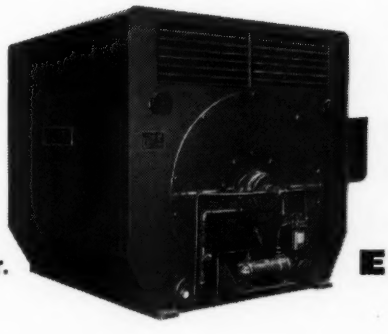
To all interested engineers we say, sincerely, "Hearing is believing." A demonstration of the "super-quiet" motor can be arranged through your Elliott representative. Or write Elliott Company, Ridgway Division, Ridgway, Pa.



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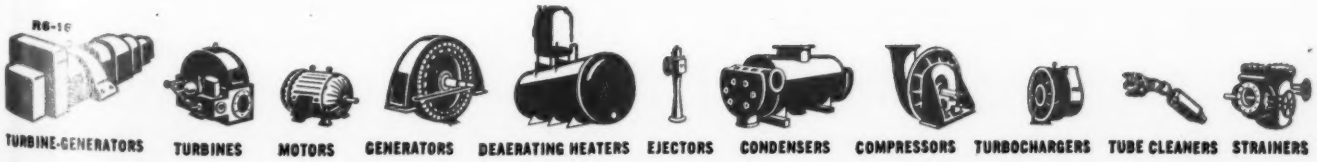

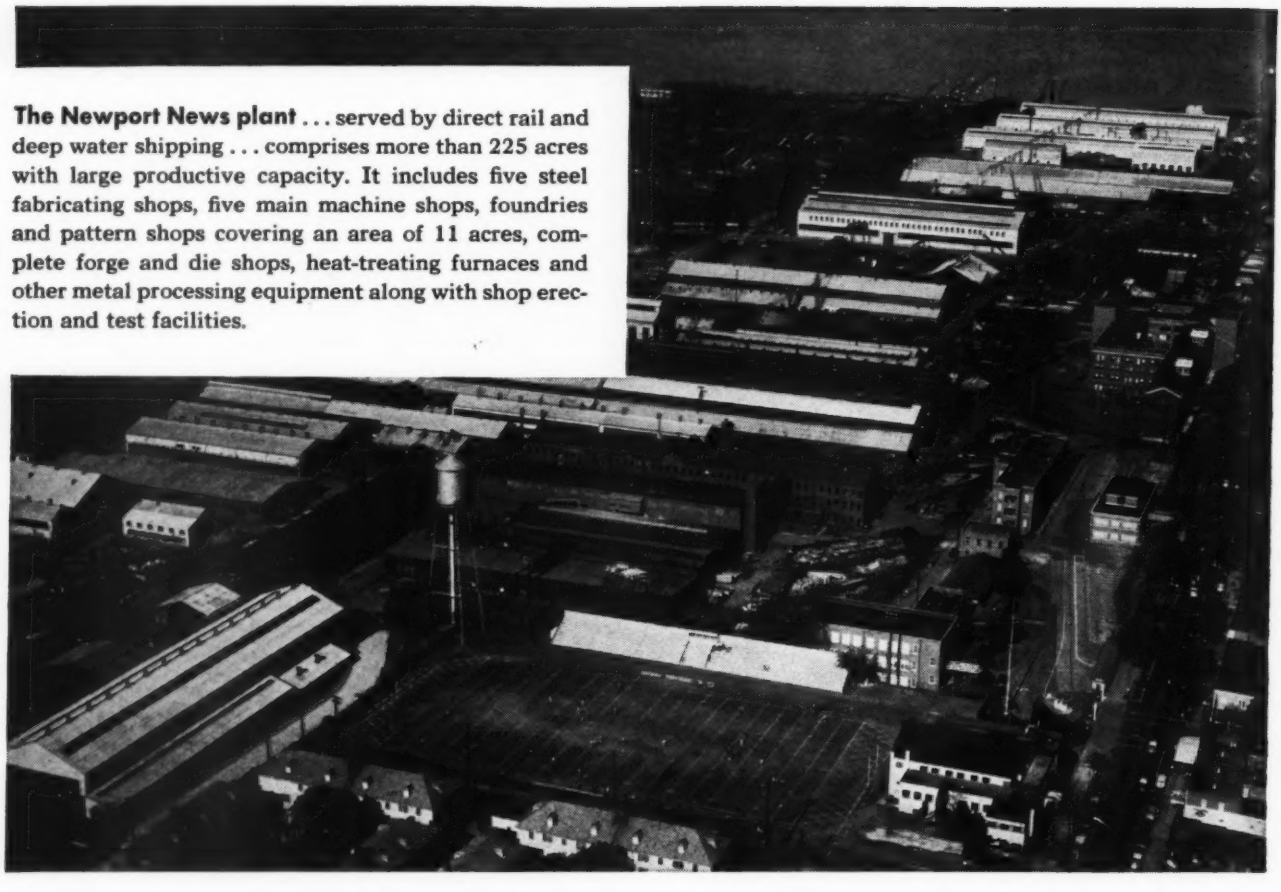

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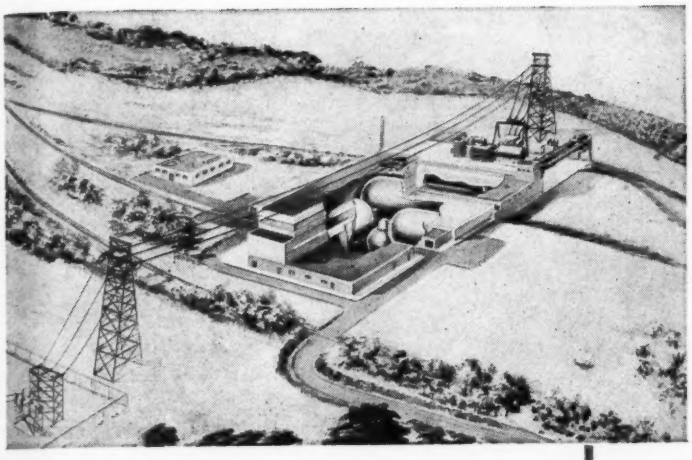
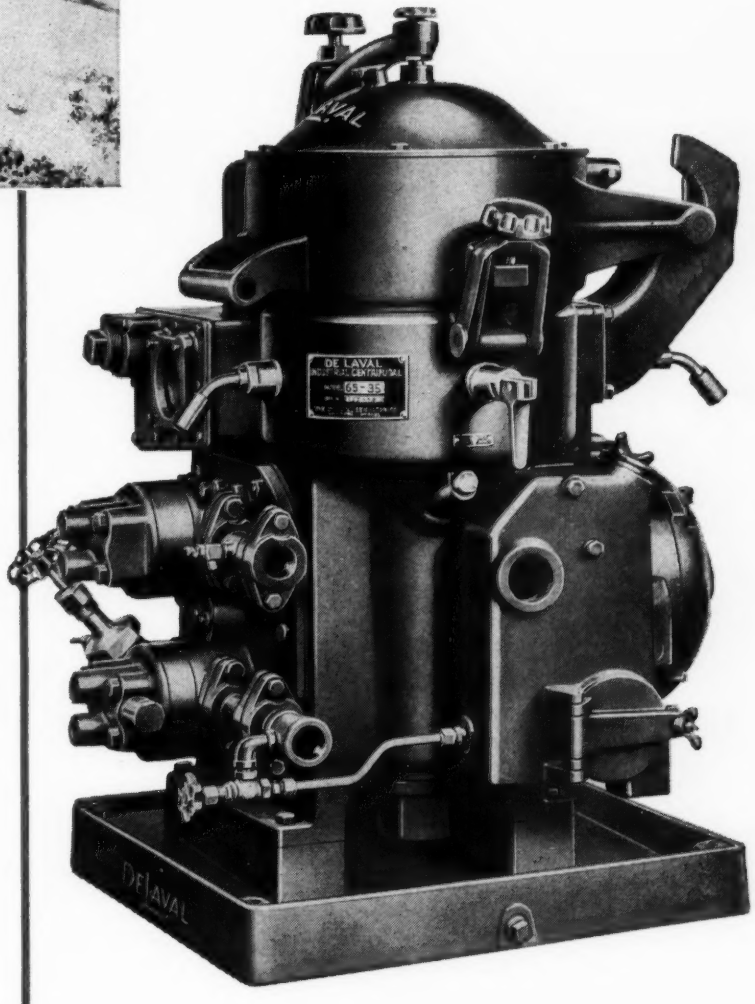


PLENTY!



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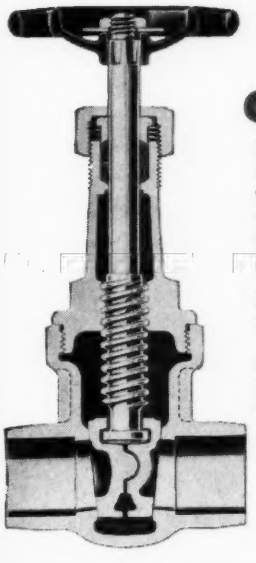
way: "Any professional service, . . . when such professional service requires the application of engineering principles and data"? There is no real reason why it should not, but an equally likely interpretation would be the following: "Any professional service, . . . wherein the public welfare or the safeguarding of life, health or property is concerned or involved, when such professional service requires the application of engineering principles and data." This definition leaves out many engineers, but it may be all the act is entitled to cover. Which it is intended to cover is certainly not clear.

However, the punctuation is by no means the only trouble with this definition. Thus, in Krebs v. Thompson, 387 Ill. 468 (Sept. 19, 1944), the court had this to say of the definition: "Here we have a definition which is all-inclusive. It includes generally all professional service which requires the application of engineering principles and data. The words 'engineering principles and data' are not defined in the act. They have no fixed and definite meaning . . . [This] definition . . . is no definition at all. It is but an attempt to delegate to the Department of Registration and Education the power to determine whether a person who renders any service . . . shall be required to secure a license under the act . . . No one can determine whether he comes within the act by reading the act itself." As a result, the Illinois court held the entire registration act invalid. Since most states have similar, if not identical definitions, this leaves one with plenty of room for thought.

In summary: "a professional engineer" is a person who knows how to engage in the "practice of professional engineering;" "the practice of professional engineering" means anything that involves "engineering principles and data;" we do not know what "engineering principles and data" are; and a person who is a "professional engineer" had better not convey the impression that he is one except under certain circumstances.

Next month we will try to put the Acts back together again. ▲▲

NEW LUNKENHEIMER SOLDER-END VALVES for COPPER TUBING



GATE

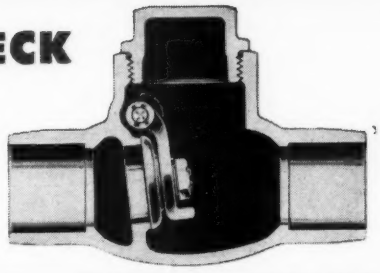
FIG. 2131
½" to 2"
125 lb. S.P.
200 lb. W.O.G.
Rising Stem
Double Wedge Disc

FIG. 2132
Solid Wedge Disc

FIG. 2133
Non-Rising Stem
Single Wedge Disc

SWING CHECK

FIG. 2145
½" to 2"
125 lb. S.P. 200 lb. W.O.G.
Renewable
Bronze Disc and Side Plugs



Easier, tighter installation! Lasting, trouble-free service!

Now you can take advantage of the superior quality, advanced design, and outstanding performance of famous Lunkenheimer Bronze Valves for your copper tubing installations!

The complete line of five patterns, with precision machined bores and ends, is designed for use with types K, L, and M copper tubing.

In operating features, materials, and workmanship, these valves are identical with the corresponding Lunkenheimer figures in the Screwed-End Bronze Valve series:

- *Non-Slip Handwheel assures tight closing*
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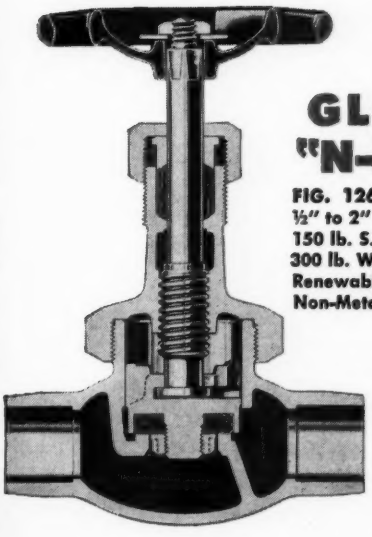

GLOBE "N-M-D"

FIG. 126
½" to 2"
150 lb. S.P.
300 lb. W.O.G.
Renewable
Non-Metallic Disc

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PROBLEM:
how to produce true linear adjustment of the ratio between input and output in a 3-15 psi pneumatic system.
SOLUTION:
THE NEW HAGAN '3-15' RATIO RELAY

This unique Hagan device fills a long felt need in pneumatic process control systems for a relay which will permit the operator to adjust the *ratio* between input and output signals.

Rugged and reliable, and requiring small space, the Hagan Model '3-15' Ratio Relay produces a true linear proportional change in the output signal. Designed primarily for use with 3-15 psig signals, the '3-15' is easily adjusted to change the minimum input and output bias values to any point between zero and six psig. The actual maximum input and output signals may be any value up to 20 psig.

The Hagan '3-15' is ideally suited for any process control systems such as fuel to air ratio in combustion processes, ratio of gases in gas mixing or in the proportional feeding of chemicals. See your Hagan engineer, or write for full details. Ask for Specification Sheet SP4315.

HAGAN MODEL '3-15' RATIO RELAY

True ratioing around 3 psig input
Compatible with any signal system whose range is between 0 and 20 psig
Simple means for altering suppressed scale setting, if desired
Mounting Plate dimensions—6⅜" x 6⅜"
Input range—0-20 psig
Output range—0-20 psig
Minimum Ratio setting—0.3 to 1
Maximum Ratio setting—3.75 to 1
Suppressed Scale Range (adjustable)—0-6 psig

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Systems and Components for: Process Control, Metallurgical Furnace Control, Boiler Combustion Control, Aeronautical Testing Facilities • Industrial Water Treatment • Chemicals for Water Conditioning

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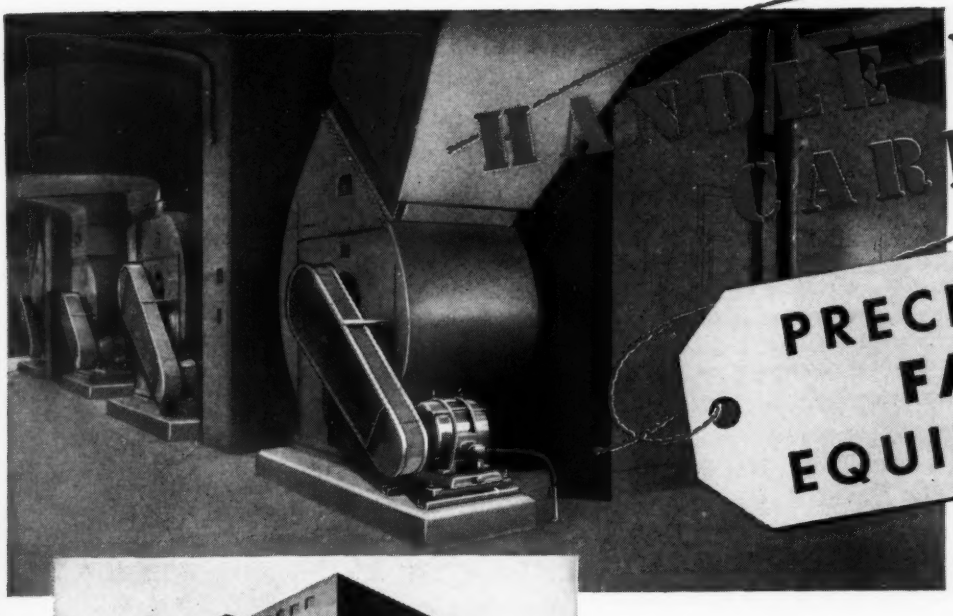
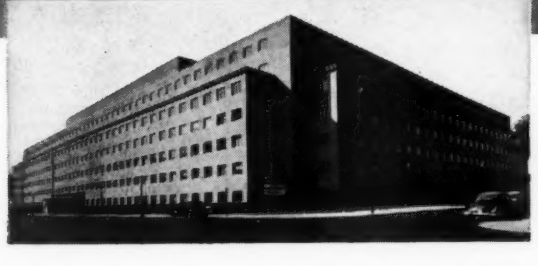
For Equipment Engineers



Battery of Type AP Fans, Sizes 365 to 445, Installed In General Accounting Office, Washington, D. C.



Get the fullest value and benefit from the careful design, features of construction, and balance built into the equipment by the factory . . . When installing Fans, take note of these helpful pointers:

- Bolt fans evenly to a substantial, level foundation. Fastenings should be carefully located to match the base and avoid warping.
- Good vibration isolation, selected to suit operating conditions, reduces noise, protects equipment and building against damage from vibration.
- Inlet and Outlet connections should be carefully aligned to avoid warping fan or ducts. Flexible connections help to offset normal variations in duct alignment, reduce noise transmission.
- Drive auxiliaries should be of highest quality, well balanced and aligned. Check for uniform tension on multiple-belt drives.
- Drive Guards are desirable for safe operation, and should be checked for conformity to applicable construction code.
- Check fit of close running parts, such as fan wheel to cone, sheaves to guards, before starting up. Fit may have been disturbed during erection.
- Check all operating instructions. Be sure all bearings are properly lubricated before running.
- Check for correct rotation. See that motor or prime mover is running correctly before connecting to fan.

Send for Informative Instruction Sheet Covering Fan Installation.

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The Reader's Guide

Man Bites Dog

When a prospect goes looking for an insurance agent, that's news. That is just about the situation in this country so far as Errors and Ommissions insurance is concerned. Very few insurance companies are interested in selling E & O insurance to engineers, and so far as we know, only the New York Association of Consulting Engineers and the American Institute of Consulting Engineers have been able to arrange group policies for their members. A number of other associations and quite a few individual engineers have been trying to get such policies for years—and can't find any insurance company willing to sell to them. Now, we have the answer. C. S. Carstens, of the H. C. Hauth Co., wants to sell you a policy. In his article in this issue he explains the policies sold to members of NYACE and AICE, and he is ready to do business.

No Lone Eagle

The use of private planes by consulting engineers may be a lot more common than we thought. When we first read the article in this issue by D. G. Volkert, we thought his use of the private plane was a good idea, but we looked upon him as a sort of engineer's Lone Eagle. Not at all. In Tulsa last week we met two more flying consultants. David R. Graham and Westley F. Shaw, good consulting engineers, each has their own plane, and they fly the planes themselves. Shaw's only complaint is that his plane is too slow. He plans to get a faster one.

Problem Unsolved

The problem of indexing and filing manufacturers' catalogs is far from solved. It is generally admitted that the AIA filing system is well conceived, but it is designed for the use of architects, not engineers. The emphasis is on the wrong syllables. In his article in this issue, E. B. Mansfield, a consulting engineer in Pasadena, Texas, outlines a method he uses for indexing catalogs. He suggests that this is a good interim answer to a problem that requires a lot more work for a final solution.

Build Now or Later

Looking a little ahead, plans for next month include an article, "Prebuilding for Future Needs," by H. B. Backenstoss, consulting engineer, of Boston. Backenstoss has made a detailed economic study and established formuli and charts by which it is possible to intelligently determine whether it is better to build a plant now to fit probable future needs—or to defer expansion until extra space actually is required. This will help consulting engineers give their clients sound reasons for prebuilding now or deferring—and thereby save them money.

History Lesson

These days engineers come in for a lot of criticism for their lack of background in the liberal arts, their inability to write interestingly, and their lack of skill in public speaking. All this is probably true. Take music for example. We know only one engineer who is skilled in playing the banjo. And not one of our engineering acquaintances is an expert at the harpsicord or known for his renditions of madrigals. Similar lack of aptitude among engineers could no doubt be found in the fields of literature, painting, and decorative glass blowing. It is indeed a good thing that engineers are apt at engineering . . . On the other hand, we agree that a little more interest in the liberal arts would do the average engineer no harm—and we are ready to assist. Certainly, it would be wise for the engineer to know more about his own profession's history and heritage. Next month look for an article that tells the story of an interesting period in the history of engineering, a study of professional development in the middle 19th century, written by Dr. Thomas Hughes, a graduate mechanical engineer who also holds a PhD in history.

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Whatever the boiler pressure, high or low, YARWAY Remote Indicators give accurate, instant, eye level boiler water level readings at any convenient plant location.

Boiler Code Case No. 1155* says in part, "... two independent remote level indicators of the compensated manometric type may be used instead of one of two required gage glasses for boiler drum water level indication in the case of power boilers with all drum safety valves set at or above 900 psi..."

YARWAY Remote Liquid Level Indicators fill the bill—and feature a "wide vision" face that makes reading easier from any angle.

Accurate—because indicator is actuated by the boiler water itself—by the pressure differential between a constant head and the varying head of water in the boiler drum.

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THE AUTHOR'S COMPANY WAS THE CONSULTING ENGINEER ON YANKEE STADIUM WHEN IT WAS BUILT BACK IN 1922. THIS PHOTO SHOWS PART OF THE GRANDSTAND ON THE LEFT FIELD SIDE.

Stadium Design Is a Challenge

HOMER T. BORTON, President
The Osborn Engineering Company

Homer T. Borton, graduate of Muskingum College and Case Institute of Technology, was formerly a Structural Engineer with the H. K. Ferguson Company. He now is President of The Osborn Engineering Company, a firm with many years experience in the planning and design of stadia and sport structures. Borton is a member of the American Society of Civil Engineers, National Society of Professional Engineers, and Cleveland Engineering Society.

CE exclusive

PLANNING A MODERN, multideck stadium presents one of the most interesting and challenging problems in structural design. Grandstands such as Yankee Stadium, those at Milwaukee and Cleveland, and others of similar magnitude with a least one upper deck, are equal in height to an eight-story building and enclose the equivalent of a city block within their exterior walls.

For a short time, each houses a population equal to a city of 50,000 to 75,000 people, administers to their wants, arranges it so that all may look out the broad front window, and sends them safely and quickly from every part of the structure when the event is over. Combine this with the fact that the building is bent into a horseshoe or oval, one side is completely open, and two thirds of the columns are removed. The front portion of the structure is cantilevered from the rear, and the floor is constructed in steps that are tilted at an angle of 10 to 35 degrees. These factors give some idea of the magnitude of the design and construction problem.

The support of the upper deck becomes very involved, since it is the part most exposed to wind and temperature. It also is subjected to variable live loads with the heaviest concentrations on the cantilever section, and it supports a press box on the deck tip. In addition to the roof (also cantilevered) the deck carries banks of floodlights on a framework that adds an extra height equal to a two-story building.

Stresses must be analyzed carefully, members must be selected for maintenance convenience as well as strength, and there can be no mistakes.

Selection of Materials

The selection of materials is important, not only from the standpoint of appearance and economy, but also from the considerations of weight, ease of erection, maintenance, and general usefulness. If we except the skin walls (where walls are used) the principal supporting structure comes to a choice of wood, structural steel, or reinforced concrete. The use of wood is confined largely to temporary stands, seats or benches, miscellaneous partitions and trim, and an occasional installation as roof deck. It is light, easily installed and easily repaired. While seldom used as the principal sup-

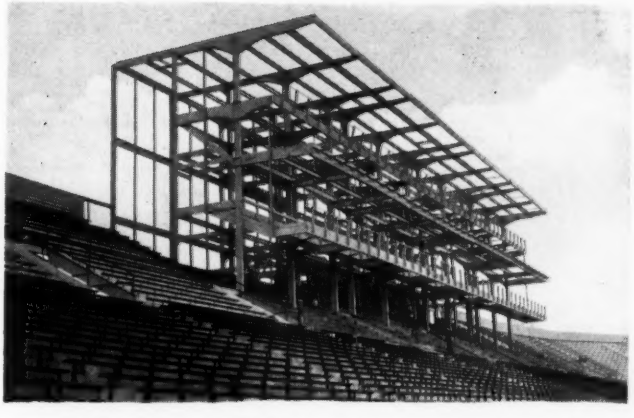
port of a major structure the obvious advantages of timber should not be overlooked.

Next in order of weight, if we except the lighter metals, which have not been used extensively as structural elements to date, is structural steel. This lends itself well to the intricacies of fabrication and is easily erected by bolting, riveting, or welding. It is adaptable to design for reversal of stress, and if carefully proportioned presents an attractive, easily maintained framework.

Use of steel as a deck, however, has certain limitations. The smooth plate must be formed for treads, treated to reduce slipperyness, and painted with a coating sufficiently tough to protect the metal from the weather and to prevent undue scuffing, which would expose the steel and allow rusting to start. Checkered plate possesses the nonslip quality needed, but carries a higher initial cost, does not bend accurately, and is hard to clean.

While repainting is expected, the presence of chairs, benches, and brackets make this operation difficult and expensive. Steel deck also is inclined to be noisy. While a stadium is anything but a quiet place and high decibel ratings are frequently a sign of joy, the tramping on decks and ramps may become disturbing if the space directly underneath is being utilized for concessions, exhibits, restrooms, or offices.

Reinforced concrete can be combined quite effectively and economically with the structural steel, the steel being used for columns, beams, trusses, and bracing, and the reinforced concrete for foundations, floors, and deck. The concrete so used is flexible in adaptation to the steps, curves, slopes, and miscellaneous detail requirements of the stadium. When used for the deck, it is weather-tight, nonslip, quiet, vibration absorbing, and, if properly laid, requires little maintenance for many years. Some use has been made of prestressed concrete, and also precast treads and risers, but to date the cast-in-place construction has proven more adaptable to stadium building because each project is tailored to specific site characteristics and project requirements.



STEELWORK FOR PRESS BOX ADDED TO STADIUM AT UNIVERSITY OF MICHIGAN IN THE SPRING OF 1956.

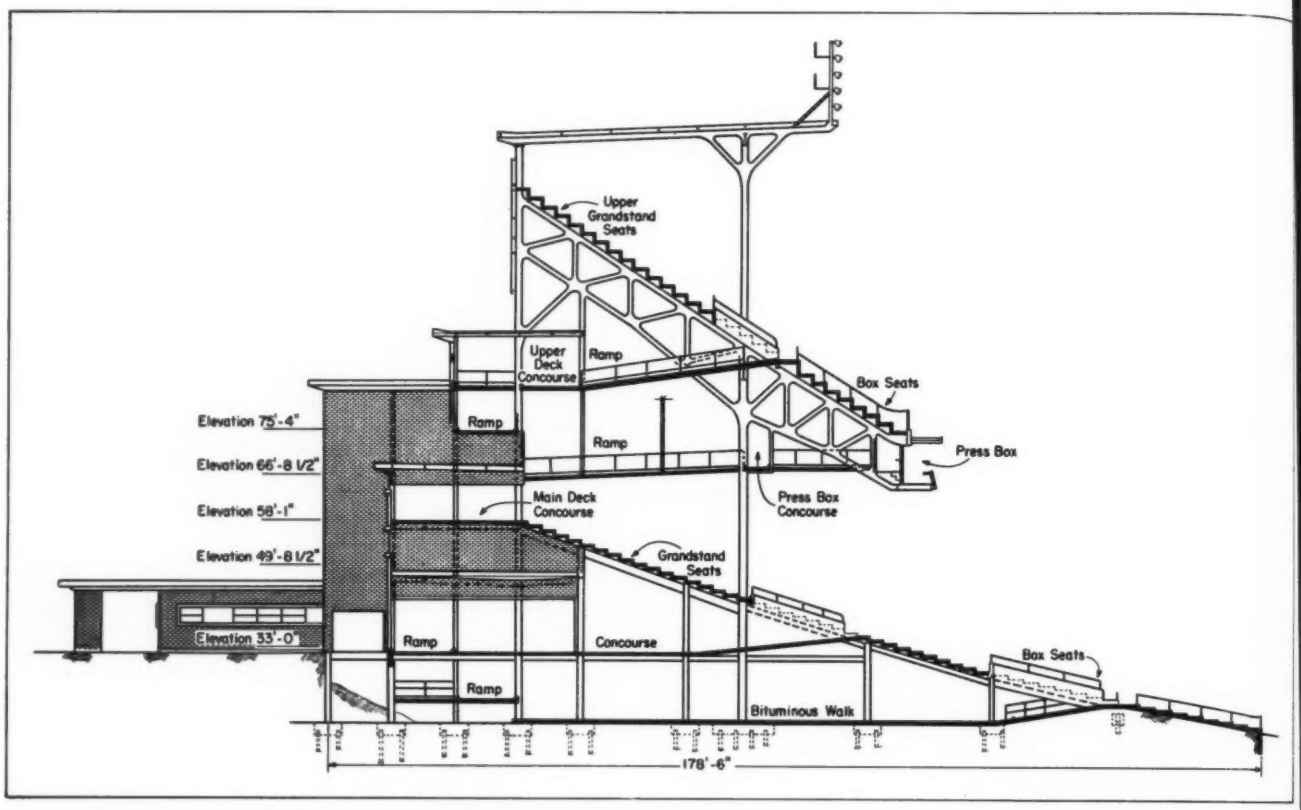
THIS PICTURE WAS TAKEN TO SHOW PROGRESS OF STEELWORK AT CLEVELAND STADIUM EARLY IN 1931.

Load Application

The load application deserves special attention because of the particular shape and exposure of the framework. In addition to its own dead weight, the upper deck is subject to the usual live load, wind, and temperature components. Here simplicity ends.

The live load consists of people who are not content to sit quietly in an assigned spot, but who move about, assemble in masses, jump up and down, and rush to points of vantage. A design load of 100 pounds per square foot of deck is needed to cover impact and guard against overstress. Combine this with the understandable tendency of spectators to get as close to the scene of activity as possible. This results in crowds assembled on the cantilevered portion of the upper deck to produce a concentration that causes uplift on the rear columns, extra load on the front supports, and sway in the structure. Trucks also use the ramps and concourses for concession supply, clean-up, and maintenance. The deck, therefore, must be designed for the expected wheel concentrations, even though the overall load may not exceed the 100 pounds per square foot needed for personal safety.

Next, the wind stress is unusually severe. This is due to the height and exposure of the structure and the fact that one side, at least, is open while the other is partially or wholly closed. Wind currents and eddies are common, the partially open deck is an ideal wind catcher, and the roof, especially, must be anchored down securely to prevent its being completely torn away in a storm. Banks of floodlights high above the roof apply an additional leverage and produce reversal of stress in many members. This framework purposely is made light. Weight is important and any reduction in section is a saving



CROSS SECTION OF NEW MILWAUKEE COUNTY STADIUM. THIS IS ONE OF THE MOST MODERN DESIGNS IN U. S.

in load and an aid to lower cost of construction.

Most important, however, is the deflection, within safe working stresses, which occurs under sudden gusts, and which allows the frame to spring slightly without transmitting the full load impact to the supporting structure. It is a tribute to the designer's luck or skill that wind damage to a stadium is practically unknown, despite the exposed position and high loads.

Temperature stresses are also severe and require that careful consideration be given to the spacing and design of expansion joints. While the exact temperature spread will vary with the climate of the locality, the daily variation alone applied to a structure so large will produce movement often measured in whole inches rather than fractions. Since the deck is exposed to the weather, the joints are kept as far apart as possible to reduce the possibility of leakage, and as close together as the design analysis indicates is practical to control overstress. This usually results in a spacing of approximately 200 feet, more or less, depending upon the length of the deck, its curvature, and the layout of ramps and sections.

In addition to these usually accepted loads, there are other somewhat intangible concentrations. These have a persistent habit of intruding themselves on the design. Failure to allow for the inclusion of some future additions often results in the need for expensive strengthening and alteration. These extra forces include (a) press, radio, or TV boxes, which invariably are located on the very tip of the overhang, (b) anchors for the backstop screen or guys for special apparatus, (c) pennant poles, flags, and banners, (d) additional or supplemental lighting, and (e) hanging scoreboards. If we could see ahead clearly, we could provide for contingencies, but since we cannot, it is safest and easiest to provide a little design insurance for future developments.

Sight Line Influences

A third controlling factor in upper deck support has to do with sight line requirements. Since spectators come primarily to witness a game or event, anything which tends to obstruct their vision is objectionable. Supports for the upper deck necessarily must extend to the lower level if one is over the other, so some seats are lost, someone sits behind a column. The roof support columns present the same problem above the upper deck. Obviously, the sure answer to this spectator complaint would be to remove all columns from the seating area. While this is structurally possible, the cost is very high and well may be prohibitive when the income gain from such a layout is estimated.

A compromise usually results, in which the columns are reduced in number, with girders or trusses substituted for the missing columns and those remaining are set well back in the deck to get as many seats as possible entirely in front of the column row. The problem then resolves itself into where to place the irreducible minimum. If we

locate the column in the aisle, passage is blocked or the aisle must be made unnecessarily wide. If it is placed in the tread, row movement is partially blocked and at least one seat directly behind the column is useless.

Our usual practice establishes one column in the seat row in the center of the row. This limits the layout to a single obstacle per section, keeps treads and aisles clear, and loses only one seat per section. Since heavy columns or bracing would provide a further obstruction, the front columns are made as slender as possible and the bracing is taken principally along the rear line. A good design keeps the sight lines as clear and the obstructions as unobtrusive as possible.

Both Planes Considered

After the column layout is fixed, the sight lines in a vertical as well as a horizontal direction must be established. This sets the height and tilt of the deck. If the upper deck is made low, commanding a good view of the playing field, the spectator on the lower level may be unable to see high flies, punts, or even the scoreboard with an degree of satisfaction. On the other hand, if the deck is too high and close to the field it becomes very steep and the upper viewers may have difficulty seeing the side lines. If the deck is made so that each row of spectators looks over the heads of all in front, it then becomes unbearably steep and high if there are more than 15 or 20 rows.

The final compromise invariably results in establishing a deck profile such that each spectator looks between the heads of the spectators in the row directly in front of him and over the heads of spectators in the second lower and all succeeding rows. The upper deck is also set back from the front line of the stands to give the higher spectator a better view of the field. This allows the lower deck spectator a glimpse of sky without feeling that the top stands are pressing in upon him.

It is these adjustments of sight lines to strength and to cost that make the design of an upper deck so difficult, so complicated, and yet so rewarding.

Maintenance

A fourth item, maintenance, never can be omitted from consideration. Oftentimes it is not the initial cost but the upkeep that hurts. The open nature of a stadium, exposed to the wind and weather, accelerates deterioration and places a severe test on materials and workmanship. It is, therefore, of great importance that the design be such that the construction can withstand the elements with the least amount of repair and replacement. To this end, the design should be clean, with as few superfluous members, intricate details, and gingerbread trim as possible. Concrete must be dense and watertight. There should be no corners to spall or break off. In structural steel, all unencased members should be accessible to painting. Heavy members with rigid connections are better than light trusses with a lot of baling wire bracing. There must be no water retaining pockets or points of potential weakness. Expansion joints should be few, free, and of rugged construction.

It always should be kept in mind that this structure is intended for the use of people. These people impose wear, sometimes very severe wear, on a stadium. They are adept at finding weak points, and ingenious in discovering ways to get hurt. They should not be encouraged by falling concrete, low headroom beams, sharp flanges, or weak railings.

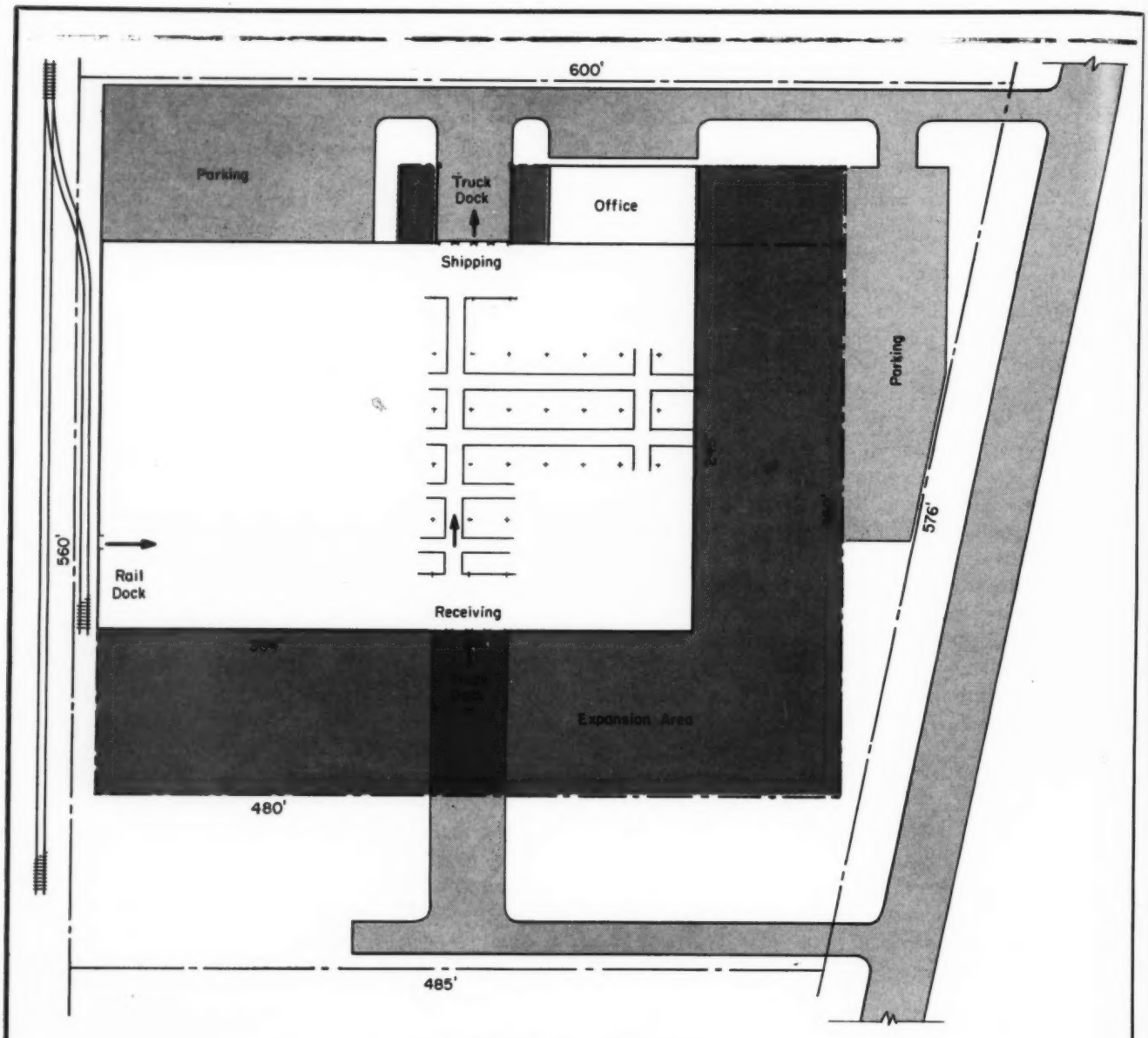
The Future

Stadium design is not hard mathematics alone, but the skill and ingenuity of the designer who applies his knowledge and experience to achieve a unique and superb result. It is progressive and adaptable. We will see new materials used, covered grandstands built, movable stands erected, better lighting installed, moving ramps to ease the climb, and other new concepts tried. The people will be much the same but with new and different wants which must be satisfied.

The problem remains, though the answers may vary, and stadium design will continue to be one of the most complex and challenging forms of engineering endeavor. ▲▲

PURPOSE MUST BE CONSIDERED. OBVIOUSLY, BASEBALL IS MILWAUKEE'S GAME.

Engineering the Functional As



Placement of a Warehouse

The problem illustrated here is to develop functional characteristics for a warehouse and determine how the building should be placed on the site to permit maximum expansion. All material will be received and shipped by truck, except for two carloads a week received by rail.

Functional specifications developed by survey indicate that 94,000 sq ft of space is required, the length should be 1½ times the width, bays should be 24 x 35 ft, and receiving and shipping should be on opposite sides of the length of the building.

Placement on the site as illustrated is advantageous for expansion in the following respects:

¶ Maximum expansion is permitted. The expanded building can be as large as 168,000 sq ft, and will still be in the recommended length-width ratio of 1½ to 1.

¶ Expansion can be in two directions without relocation of the shipping dock, rail siding, or office.

¶ Without changing the siding, doors can be cut for shipping by rail, and additional spots also can be created for rail receiving.

¶ Truck docks will be centered on the long sides of the building when expansion is completed.

¶ The office can be expanded to twice the original size but will still remain close to the shipping operation.

¶ More truck spots for receiving and shipping can be constructed next to the present spots.

¶ To reduce congestion, separate roadways are provided for receiving and shipping, and these will not have to be relocated because of expansion.

¶ Employee parking lots will not interfere with new construction when the building is expanded.

Aspects of Industrial Plants

DONALD R. NEIL

Donald R. Neil is a partner of Drake, Startzman, Sheahan and Barclay, management consultants of New York. His firm is a member of the Association of Consulting Management Engineers and is the largest in the country specializing in physical distribution and materials handling—the control, storage, and movement of materials.

Neil is a native of New Jersey and attended the public schools of East Orange. He was appointed to the United States Military Academy, and in 1930 was graduated with a BS degree and commissioned a Second Lieutenant in the Regular Army. During the next 12 years he supervised construction projects of air fields, ammunition depots, warehouses, barracks, and quarters throughout the country and the territory of Alaska.

He attended the Massachusetts Institute of Technology for special study in construction, and in 1933 received a BS degree in Building Engineering and Construction.

During World War II he served four years in the European Theater of Operations attaining the rank of Colonel in December 1943.

Colonel Neil resigned from the Army in 1946 to become Treasurer of Paul A. Straub and Company, an importing business in New York City. He became associated with Drake, Startzman, Sheahan and Barclay in 1951 and was invited to become a Principal of the firm on Jan. 1, 1953 and a Partner on Feb. 1, 1954. Since January 1953, Neil has supervised surveys of a variety of materials handling operations in warehouses and plants, in industries both in the United States and Canada.

BURR W. HUPP

Burr W. Hupp, an Associate of Drake, Startzman, Sheahan and Barclay, management consultants of New York, was born in Indiana and received his Bachelor of Arts degree from De Pauw University. He completed a year of graduate work at American University, Washington, D.C., studying the relationships of business and government. He was working for a doctor of philosophy degree in economics at Northwestern University, Evanston, Illinois, and had completed two years there when the war interrupted his studies.

During the war, Captain Hupp served with the Storage Division of the Army Service Forces in Washington. This agency was responsible for supervision and coordination of depot and materials handling activities of the Army.

At the close of the war, he joined the staff of Drake, Startzman, Sheahan and Barclay, working with clients of that firm in development of improved distribution and handling practices. He has specialized in physical distribution and materials handling costs, estimates of storage space requirements, development of systems of traffic, production and inventory control, and control of the flow and storage of materials. He was Assistant Manager of an over-all survey of the Army transportation system.

After the outbreak of war in Korea, Hupp was recalled to active Army duty and assigned to the Office of the Assistant Chief of Staff, G-4 who had Army-wide responsibility for supervision of procurement, supply, and logistics. He returned to Drake, Startzman, Sheahan and Barclay in 1952 and was named to his present capacity as an Associate of the firm in November 1955.

ONE OF THE MARKS of a good industrial building is integration of the structure with the operations performed within it. To achieve integration, the operations must be planned first, then the building designed to house them. The planning of operations is the business of the industrial engineer. The design of the structure is the responsibility of the structural engineer and the architect. Integration depends, therefore, on coordination of the efforts of the structural designer and the industrial engineer.

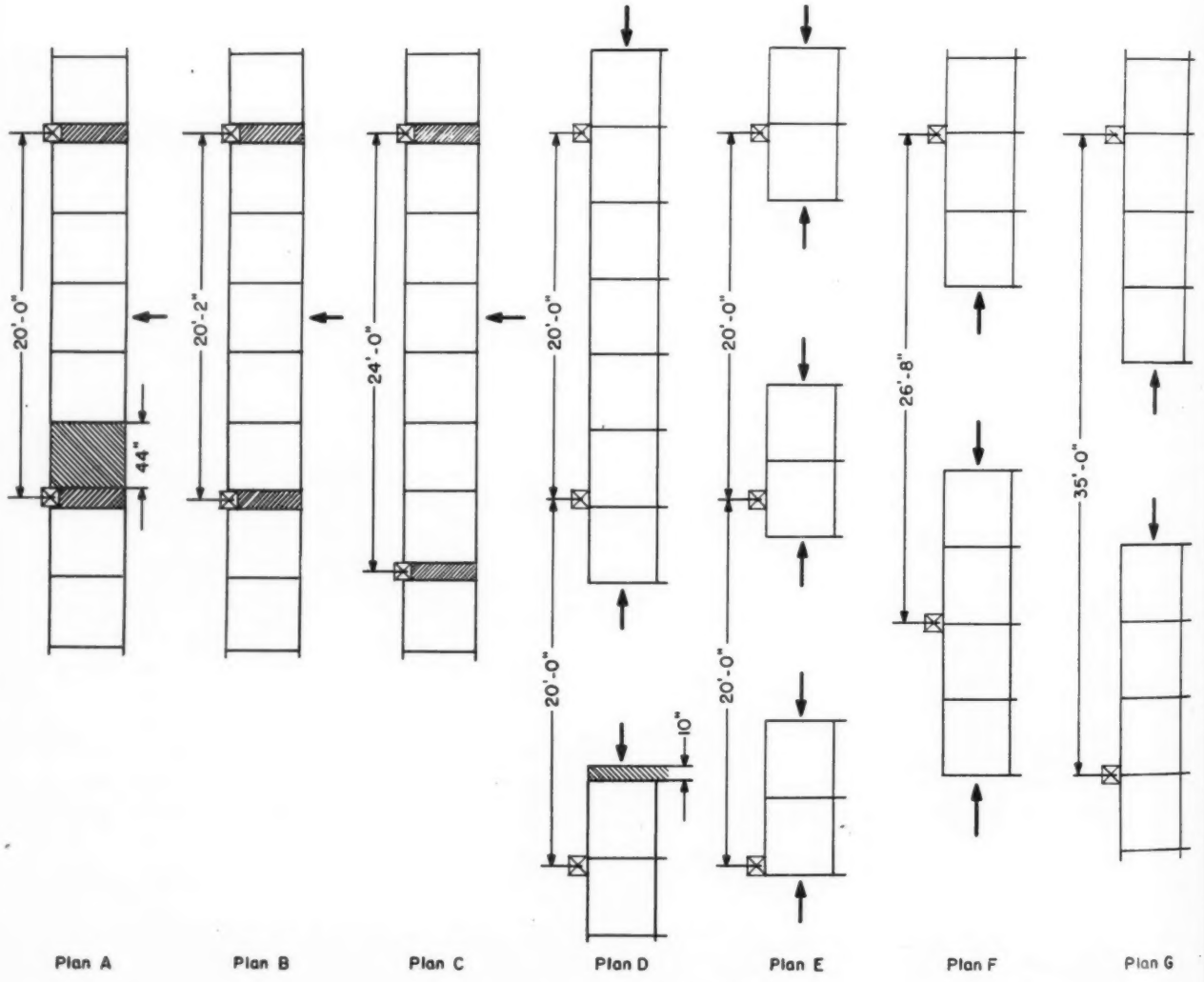
The ideal working relationship between the two is illustrated by the experience of a firm that needed an office and warehouse building of 100,000 sq ft. It first commissioned industrial engineers to determine space requirements of each department, space allocations based on relationships between departments, and functional characteristics of the proposed structure as dictated by operations performed by these departments. This work was done before any drawings were prepared or architectural limitations established. Once it was completed, the company, the engineers, and the architects were prepared to discuss such features as the number of floors, column spacings, and placement on the site. As a result, the new plant will be sound both architecturally and operationally.

Another company, however, accepted the design for a new plant and began construction. At that point, too late for major structural changes, it called

in engineers to develop operating methods to be used in the new building. One end was intended for receiving and raw materials storage, and the center for manufacturing. Between the two was a Chinese wall of offices and washrooms. The building was more than 400-ft wide, with four, 10-ft doorways between the two areas. No materials could flow straight through from receiving to manufacturing. Everything had to be moved across the building, through one of these congested passageways, then back the same way upon completion of the operation.

To say that operations should be planned before a building is designed is not to say that architectural considerations are secondary. There must be give and take on such matters as bay size, shape of structure, and location of services. But both architectural and operational viewpoints must be represented.

The architect and his associated structural engineers are the specialists in building techniques and materials, in translating requirements into building



Determination of Bay Size

This drawing illustrates a method to determine the best spacing for columns in a proposed warehouse. Merchandise will be stored on pallets measuring 48-in. deep (stringer length) by 42-in. across. Since allowance must be made for overhang of merchandise and clearance between loads, each pallet requires a 50 x 46-in. space. Aisles will be 10-ft wide, and columns 1-ft square.

Plans A, B, and C show various column spacings with the 46-in. dimension of the pallet space on the aisle. Plans B and C are good, but nearly 20 percent of the space is lost under Plan A as indicated. If construction costs are about equal, Plan C is better than B because it makes better use of space.

Plans D through G show column spacings to accommodate the 50-in. dimension running back from the aisle. Plan F is good, but G is the best because it makes full use of space and permits flexibility in storage arrangement. Storage blocks will average 3 deep, with an aisle in each bay, but they may vary from 2 to 10 deep.

For a large warehouse, a bay 24 x 35 ft would be the recommendation of the engineers.

plans and specifications. The industrial engineer is the specialist in space requirements, layout, and the functional characteristics required in the building—that is, requirements as to flow of materials and travel distances, movement of personnel, shape of structures, bay size, ceiling height, floor load rating, number of floors, handling methods, lighting, heating, elevator capacities, location and size of docks and doors, and provision for hazardous processes.

The special skills of both structural designer and industrial engineer are available to clients planning new structures, and both should be employed.

One of the pitfalls in designing an industrial building is to presuppose that operating procedures now in effect will be continued at the new site. Once a building is constructed, it imposes certain limitations on operations. This explains why operations should be planned before the building, and why operations may be altered radically and improved when they are moved from an old building to a new one. In all probability, present operating methods were dictated largely by present facilities.

Coordinated Efforts

What can be accomplished through coordinated efforts of architect and engineer is illustrated in a recently constructed truck terminal. Preliminary designs assumed that a fork truck system of materials handling, which had been in use in the former building, would be continued in the new. Columns were to be 10 ft from the dock edge on 20-ft centers, doors were to be at all spotting locations, and roof overhang was to be 10 ft.

Before the plans were finished, an engineering study was commissioned. It disclosed that a dragline system of handling would result in a more economical and generally satisfactory operation. A dragline would have been impractical in the new terminal as planned, and the dock would not have been long enough to accommodate the required number of trucks. Construction plans were changed in accordance with these findings and alterations were made to put the columns at dock edge, since the 10 ft planned between edge and column normally is wasted; to space columns on 24-ft centers and allow 12 ft of spotting space for each trailer; to extend the overhang to 15 ft for extra weather protection; and to eliminate doors.

The advantages of these changes were:

¶ A 20 to 30 percent increase in dock productivity over a fork truck system.

¶ Faster handling of traffic.

¶ Less damage to freight.

¶ Faster spotting of equipment with less damage to trailers.

¶ Better protection against the weather.

¶ Saving of the cost of unnecessary doors.

¶ Sufficient space, through lengthening the dock, to spot the required number of trailers.

In another instance illustrating architect-engineer coordination, a distributor had purchased a warehouse and planned to add 35,000 sq ft to meet what he believed were his requirements. Before plans were drawn, both architects and engineers were retained to assure sound solutions of such problems as the location and size of the addition; rail and truck dock requirements; inventory requirements; handling methods for receiving, storing, order filling, and shipping; column spacings and ceiling heights; and location of shop facilities.

As a result of the engineering survey, inventory was reduced, and improved materials handling methods were developed so that space requirements were reduced 8000 sq ft and the number of employees from nine to four.

Example

To illustrate further the functional characteristics furnished by engineers to architects, here are the principal items for a key terminal of one of the largest motor carriers: length (700 ft), width (100 ft), column spacing (24 ft), handling system (dragline), dragline location (14 and 24 ft from dock edge), ceiling clearance (12 ft 6 in.), height above driveway (46 and 52 in.), lighting (spots into trailers), location on site (maneuvering and parking requirements), and location of scales (centered on pickup unloading, inside the dragline).

Engineers Called Too Late

But contrast these examples with the experience of a printing company, which engaged industrial engineers after footings, foundations, and underground plumbing mains were in and columns were being erected. Briefly, the engineers' findings were:

¶ One dock was to be used for both receiving and shipping. Since this arrangement would result in cross travel and congestion, separate docks were provided and the basic layout and flow of materials were changed from an "O" to a "U" shape. The finished goods warehouse also was relocated.

¶ As originally planned, service departments would create a 48-ft barrier between warehouse and press room and between press room and finishing. These were moved away from the main operation to less valuable space.

¶ Since the need for storage banks between processes had been overlooked, space was laid out for temporary in-process storage.

¶ It had been assumed that the press room needed north light. Investigation disclosed that the presses could be moved and lighted by skylight and fluorescent fixtures. Relocation of presses permitted other changes that were desirable but that previously were thought to be impossible.

Modification of the original plans saved the company $125,000 a year, but the changes cost $75,000. If the engineers had been called in to work with the

architects at the start, $75,000 and four months of construction time would have been saved.

Engineering Approach

In order to appreciate the respective responsibilities of architect and industrial engineer and the ideal working relationship between them, let us examine the approach used by an engineer engaged to develop functional characteristics for a receiving dock. His attack on this problem is instructive because it is similar to that he would use on raw materials storage, manufacturing, finished goods storage, shipping, or any other major function performed in an industrial building. His objective is not only to plan that part of the building to be used for receiving, but to develop the best operating methods for the materials that will be received.

The engineer's first step is a review of the present operation and isolation of controlling factors that make it necessary to operate that way. He analyzes structural characteristics of the facility, allocation of space, layout of areas, and location of the receiving department with respect to other functions. He studies the organization, for he may find that reassignment of duties and clarification of responsibilities is advisable. He tabulates manpower data — number of employees, their schedules and duties, and payroll costs. Reassignment or rescheduling of men may be indicated, and the data will be used later to measure the savings that can be made with improved methods, facilities, and equipment.

Problem Analysis

He reviews procedures — unloading (checking, tallying, and receipting), sorting and identifying, inspecting, documentation, and dispatching of materials. He studies the nature and characteristics of the work done in the receiving department — the quantities of materials received and the increments in which they are received and handled, types and sizes of containers (so that he may plan handling units and pallet patterns), weight of packages, number of shipments processed, pieces and weight per shipment, number of cars and trucks received, weight received by truck and car, rate at which material is unloaded, and accumulations and banks.

At this point, the engineer begins to put together and to analyze his data. For truck receiving, as an example, he must determine the approach to the dock and the apron space needed, length of dock and number and width of truck spots, height of dock, lighting, and number and type of dock plates. He studies the operating procedures to find how they can be simplified, what unnecessary handling and purposeless functions can be eliminated, and what steps can be combined. He determines the most suitable handling system, the handling units, and the equipment needed. His objective is a coordinated system for movement of materials from car or truck, through receiving, to storage or the first manufacturing operation. He checks his tentative conclusions to ensure that he has selected the best of alternative possibilities and that the equipment is economically justified.

Design Work

Now he is ready to develop space requirements and functional characteristics for the structure. The general rule he follows in designing receiving facilities is that the rate of flow of materials through the work areas and the turnover of storage space at the normal peak load will govern the amount of space needed. This is why he began his study by collecting data on volumes and characteristics of materials handled and on relationships between receiving and raw material storage or manufacturing. He determines whether the receiving areas should be enclosed, whether rail tracks should be inside or alongside the building, and whether the truck dock should extend out from the building or be inset.

He allows space for working behind each car and truck spot; for offices; for functions such as checking, sorting, and inspecting; and for banks of materials in order to stabilize the flow between receiving and the next department. By projection, he estimates the volumes and types of material to be handled in the future and makes provision for possible expansion. He lays out the space and plans travel paths through it. He also prepares an operating plan — a detailed procedure of how the department should function and an explanation of handling methods, planning and scheduling, paper routines, and routing and dispatching.

Finally, from workload data, space layout, and operating plan, he develops manpower and equipment requirements and space, labor, and equipment costs and savings — checking back to ensure that his proposals are all economically sound.

Coordination of Work

Meanwhile, his colleagues have been similarly engaged in other departments. From the outset, they have been coordinating their work and conferring with operating personnel, architects, and consulting engineers. At the conclusion of the survey, therefore, they are able to recommend functional characteristics of the building, layouts of areas, operating methods, and equipment on which basic agreement already has been reached with the management of the company and the architects and engineers. The new building and the new operation are planned not separately but jointly.

When the structural group and the industrial engineer work independently, the result may be a facility that hampers and restricts what can be done within it. Only coordinated efforts can produce plans distinguished for true integration of structure and operation. ▲▲

THIS 5-PASSENGER BEECHCRAFT TWIN-BONANZA OWNED BY EWIN ENGINEERING IS THE REASON THIS CONSULTING FIRM CAN HANDLE WORK ALL OVER THE MAP.

Private Plane Speeds Client Contacts

D. G. VOLKERT, President, Ewin Engineering Corporation

D. G. Volkert is a graduate of Cornell University. His professional experience includes eight years as superintendent of engineering and maintenance for Hoagland Realty Corporation, New York; seven years as vice president in charge of engineering and construction for Huyler's; and seven years as president of Southern Industries, Mobile, Alabama, (a holding company). During the time he spent with Southern Industries, Mr. Volkert was personally in charge of Ewin Engineering Corporation, one of the affiliated companies, as chairman of its board. About two years ago he and associates purchased the engineering concern from Southern Industries and he now devotes full time to it as president. Volkert is a Registered Civil Engineer, and he is a member of the Society of Military Engineers, American Water Works Association, and American Concrete Institute.

THE INCREASING demand for the services of consulting engineers is resulting in ever-widening use of private airplanes. Time conservation is a primary reason, but almost as important is the fact that consulting firms, formerly operating in fairly limited areas, have extended their horizons hundreds or even thousands of miles by using their own planes.

By joining the owners of 21,500 full-time business airplanes, consulting engineers find themselves in a position to contract and supervise jobs previously turned down because of the time and expense involved with other forms of transportation, even commercial airlines. This point is illustrated by the experience of our firm, headquartered in the Deep South. We currently are handling projects a thousand miles away — in three different directions.

Ewin Engineering Corporation, of Mobile, Ala., has more than trebled its geographical area in the last five years. This growth would have been impossible without the company-owned airplane. Within a single week, I conferred with our executives in South Florida (where my firm serves as section engineer on the Florida State Parkway), at Port Houston, Texas (where we are supervising docks, transit shed, and office construction for Pan Atlantic Steamship Corporation), and in Washington (where we are assigned to the Redevelopment Land Agency's reclamation program for the District of Columbia).

Time-Saving Factors

I find the 185-mph cruising speed of our Beechcraft Twin-Bonanza accounts for only part of the time saved by flying. (After all, commercial airplanes travel much faster than that.) The real time conservation comes in being able to write my own schedules and in avoiding delays waiting for limousines or waiting for baggage at airports.

There is another point particularly important to the consulting engineer. While some 500 U.S. cities are served by scheduled airlines, over ten times this number of smaller communities have airports but no airline service. At the same time a substantial number of construction projects are taking place in small towns and cities. Thus, plane ownership makes more accessible these 5500 towns and cities to which no airline can sell you a ticket.

In our firm, plane ownership means our principals can be on the scene, at will, at such projects as the sewage disposal jobs the firm has under way at Indianola, Miss. (which has no airline service)

VOLKERT FEELS THAT AN INSTRUMENT RATING IS AN ASSURANCE OF SAFETY IF YOU ARE TO FLY A PLANE.

and Dothan, Ala., (served by only one scheduled flight daily from Mobile).

Another such project which we recently completed was the $4,000,000 program of municipal improvements at the town of Ozark, Alabama, in the southeastern part of the state. This town's population increased from 3600 in 1940 to an estimated 10,000 just 12 years later. The water supply was overtaxed to the point where rationing was considered, and an inadequate sewer system posed health problems. In carrying out this assignment, we were responsible for the design and engineering of the various projects, including preliminary engineering and economic studies, and the preparation of the necessary application and supporting documents to obtain federal aid in financing the improvements. We completed the modern municipal building, an adequate water system, a 1,000,000-gpd sewage plant, and seven miles of streets while working on other projects for more than a dozen Alabama municipalities at the same time.

Availability of Executives

As our air-borne engineers increased their scope of operation, offices were opened in Tallahassee and Miami, Florida, and Washington, D. C. I divide my time among the offices, attending meetings and consultations in each area with complete freedom.

Aside from making it possible for us to handle a greater volume of work, regardless of location, flying our own plane definitely cuts down on unproductive executive time. It enables us to make the most of the working hours of key men. For example, I now fly an average mileage of 5000 or 6000 miles a month. Operation of our plane on its present schedule of 350 to 400 hours annually saves me from 40 to 60 working days each year.

The importance of using a plane in reaching distant points for business conferences and for following the details of work in progress cannot be overemphasized. It would be impossible for us to attend to our business in Washington alone if we did not have our own aircraft.

Piloting the Private Plane

The hiring of a company pilot depends on individual situations. I have flown for 25 years and feel it is more to our firm's advantage, both in expense and convenience, to do without an outside pilot. However, with the complexity of air traffic at the large metropolitan centers, I would not advise anyone to plan to fly himself into high traffic areas until he has at least a commercial license with instrument rating. The instrument rating may not be actually necessary, but it does assure greater safety.

For aircraft owners who do not desire to pilot their own planes for personal reasons — or in instances where use of the company plane is spread over a fairly large group of persons — an employed pilot is the practical approach. While still affording key executives the valuable service of immediate transportation to and from locations where their presence is needed, it places the controls in the hands of an expert who is thoroughly familiar with the craft under any set of circumstances. This system is followed by many of the larger firms who operate their fleets of airplanes on an almost professional basis.

The expense of an outside pilot is estimated at approximately $600 monthly salary, plus pilot's expenses away from base — or about $20 a day, plus expenses, for each ten hours of operation.

Surprising as it may seem, however, 67 percent of all private business aviation is made up of small, owner-operated aircraft. Initial costs of these craft vary greatly according to the type, model, and optional equipment desired. A standard, single-engine model is sufficient to carry out one organization's requirements — while another business picture may call for a dual-engine, executive model, fitted out with luxurious appointments.

Private Plane Economy

From a standpoint of economy, the picture is also good. Privately-owned planes reduce the number of unproductive travel hours, there are fewer en-route meals and sleeping accommodations to buy, lower expense accounts, and no extra fare for passengers.

We figure the total operating cost per hour on the Twin-Bonanza, which seats five, at $65.29. This is based on flying time of 360 hours annually, with an average of 30 hours per month. The cost per mile, computed at 185-mph average speed — including normal take-off time, taxiing, 750-fpm climb and approach maneuvering — amounts to 35.3 cents. Should flight time be extended to 1200 hours annually, this cost would be lowered to about 18.5 cents. As hours in flight time go up expense goes

down. This automatically reduces the cost per individual job, and raises the percentage of return on the original aircraft investment.

Cost per seat mile over 66,600 miles per year, five seat capacity, is 7.1 cents. However, since all seats are not occupied on every trip, approximately ten cents a seat mile might be a more realistic average. These figures include the totals of complete fuel and oil costs, depreciation, maintenance, and insurance.

Fuel costs are based on gasoline consumption at recommended cruise power of 65 percent at 10,000 feet, with allowance for warm-up, taxiing, and climb to altitude. Oil consumption includes allowance for oil change every 50 hours.

Depreciation of the hull is spread over a five year period, at 16 percent per year, with a 20 percent residual value. The C50 Beechcraft costs about $85,000 for plane and additional equipment.

Estimated maintenance costs cover 100 hour inspections and major engine and airframe overhauls, including parts. Broken down, this represents hangar rental at $900 a year, plus 45¢ an hour storage away from base — inspections, miscellaneous repairs, parts, and reserve toward 600 hour engine overhaul.

Insurance coverage of hull and equipment includes all risk, fire, theft, and crash, on the ground and in flight. Cost is figured on public liability insurance at $100,000 to $300,000, passenger liability at $100,000 per person, and property damage at $100,000.

The question of general safety in flying presents one of aviation's greatest obstacles — which in turn becomes one of its strongest selling points. Insurance company records show the private company plane to be one of the world's safest forms of travel. As a matter of fact, they consider an airplane pilot twice as good an insurance risk as a house painter. They list transportation fatalities, per 100 million passenger miles, as 0.14 for executive and corporation aircraft — scheduled air transport planes rate at 0.58 while automotive vehicles rate a high 2.90.

Advantages for Consultants

The important question in consulting engineering circles seems to be — does privately-owned business aircraft pay? Judging from the numerous converts to aviation in the profession, and the fact that once they begin to fly, they keep flying, the apparent answer is, yes! Profit far outweighs expense, to such an extent that almost without exception a firm's first aircraft venture has been followed by a second and third investment on a larger, more luxurious scale.

Like Ewin, consulting engineering firms that have, thus far, exploited their air-borne mobility, are enjoying prosperous expansion of their interests with amazing rapidity. Many, fighting against the bottleneck of distance plus time, have been able to overcome and actually make these former drawbacks into an advantage.

It is most impressive to have a client make a trouble call to an engineer, hundreds of miles away, and have him turn up in person in two or three hours. That impression of immediate availability when the need arises has signed more contracts and created more new projects for the air-borne consulting engineer than could have been imagined a few years ago.

In no other field could private air travel be more practical or more infinitely advantageous. Besides helping the engineering firm to gain a foothold in areas away from home base, private ownership of aircraft affords the engineering consultant additional opportunity to perfect his particular field of action, building a national reputation on the way.

In view of experimental results with privately-owned airplanes in the profession, it would seem wise for small engineering firms to map out a sound program of modern expansion through aviation. Today, the trend is definitely toward air-borne engineers presenting nationwide services with mobile efficiency and prestige. ▲▲

VOLKERT, PRESIDENT OF EWIN ENGINEERING, OFTEN TAKES MRS. VOLKERT WITH HIM ON HIS PLANE TRIPS.

Here it is at last--a standard policy providing

Errors and Omissions Insurance For Consulting Engineers

C. S. CARSTENS
H. G. Rauch Company, Inc.

CE exclusive

A CONTRACTING FIRM installed an iron railing around the balcony of a building constructed by them. Two years later, a resident of the building leaned against the railing and was killed when it collapsed. The contractor was sued for a large sum on the contention that the rail supports were anchored insecurely. When the suit came up in court, the designing engineer was involved in the case when it was proven that the installation of the railing was done according to plans drawn by the engineer and furnished by him to the contractor. As the design was held to be faulty, the engineering firm was found negligent, and a large judgment was obtained against them while the case against the contractor was dropped. Had the firm of engineers been carrying sufficient "Errors and Omissions" insurance covering their operations, they would have been covered for the amount of the judgment, including court costs.

Malpractice Insurance

Many years ago the medical and dental professions discovered that their practices subjected them to claims and law suits alleging malpractice or breach of their professional duties in other respects. While many claims were proven groundless, the professional man could be brought into court and compelled to defend himself at his own expense even though blameless. Occasionally, he was found negligent by a court of law and judgment obtained against him. Malpractice insurance became a necessity in these professions. Insurance companies soon responded by issuing liability policies that paid the cost of legal defense and judgments.

Before long, however, this class of insurance became unprofitable and most companies discontinued writing policies altogether. A few companies, by careful screening of risks, continued to issue policies but at a constantly increasing premium. Doctors and dentists, therefore, were faced with the alternative of paying high surcharges for their insurance or dropping it.

Medical and dental societies and organizations then became interested in the problem, and finally, through concerted action, worked out an insurance

program that produced results found satisfactory both to the professional man and to the underwriting companies. Today, under a group insurance arrangement sponsored by regional medical societies, any medical doctor in good standing can buy the liability protection he needs at a cost he can afford.

Accident at N.Y. World's Fair

Engineers and architects for many years were singularly free from claims alleging damages caused by errors or breach of professional duties. When mistakes were made, the matter usually was adjusted amicably by the owner, architect or engineer, and contractor. Resort to law was rare.

However, at the end of the New York World's Fair, in 1940, a serious accident occurred that brought about far-reaching changes in the field. A prominent New York architect who had designed one of the larger buildings at the Fair, the firm engaged to do the structural engineering work, the contractor, and the owner all were sued for a large sum. The ceiling of the building had collapsed suddenly while the structure was being demolished, killing and injuring several employees of the demolition contractor. A very large judgment was obtained against the defendants, excepting the architect who was held blameless. His firm, however, incurred heavy expenses for defense.

The decision of the courts in this case caused a stir among professional men in New York, and a number of prominent architects and engineers met to discuss the situation. As insurance protection appeared essential, it was decided to commission Mr. Herbert C. Hauth, who had been active for many years in the construction insurance field in New York, to make a study of the matter. There followed two years of effort to interest American underwriters in issuing a comprehensive, unrestricted form of policy to insure architects and engineers for "any negligent act, error, or omission committed in the conduct of their professional duties." Without any background in the field and with no loss experience as a guide, conservative American companies were found unwilling to accept the entire risk. The line of insurance was so specialized and had such a limited market that many restrictions were felt to be necessary, and the insurance offered proved of little value.

First Unrestricted Policy

Lloyds Underwriters, in London, then were approached, and after many months of work on the form, policy conditions, and rate structure, the first unrestricted Errors and Omissions policy in the United States was prepared and offered to New York architects, in 1945, under the sponsorship of the New York Chapter of the American Institute of Architects.

About a year later, the contract of insurance also was made available to consulting engineering firms in the New York area. The policy offered was extremely broad, the only exclusions being claims arising from libel and slander, dishonesty of the firm or any of its employees, and fraud. A warranty was added providing that the policy should be free of claims arising from negligent acts, errors, or omissions committed prior to the effective date of the first policy. A deductible clause of $250.00 was applied to any loss in order to eliminate small claims which, presumably, could be adjusted by the principal with his client.

The experiment was like sailing in an uncharted sea. After two years of experience, it was found that the rates charged were producing inadequate premium income to pay losses. The policy also was found to be so broad that it could be called upon to pay losses due to circumstances or happenings far removed from the original intent to indemnify the assured for errors committed in the conduct of their professional duties.

New Rates

An application form then was devised to make it possible to tailor the policy to the exact requirements of each assured, and a schedule of rates was put into effect which, for the first time, endeavored to measure the hazards involved in the operations of each firm and to charge a premium commensurate with the various exposures found to exist. Experience rating also was introduced into the rate structure. Thus, those risks reporting no losses during a five-year period were granted a discount in rates, while those suffering losses were then charged a nominal increase upon renewal. To the best of our knowledge, no policies have been cancelled on account of unfavorable experience.

Thus, after ten years of experience in the field, Lloyds Underwriters and a number of other strong London companies today offer a contract of insurance to any consultant who wishes to insure his common-law liability for "Errors and Omissions."

Full Coverage

It is important to understand that these policies of insurance cover errors whether an accidental occurrence causes bodily injury and property damage or not. Far more important, the insurance covers the engineer's liability if he is found negligent for committing an error in design that requires structural changes after construction is under way or completed and, as is likely, he is called upon to defray the cost of the change.

In addition, should the engineer supervise the work of the contractor, even greater responsibility may be thrown upon him should an accident occur injuring persons or damaging property. Should the instructions of the field engineer be held to have contributed to faulty construction or to failure of the work of the contractor to meet the standards

Outline of Errors and Omissions Policy

A. INSURING CLAUSES

I. This policy is to indemnify the Assured against any claim or claims for breach of professional duty as ——————(Consulting Engineers) which may be made against the Assured by reason of any negligent acts, errors, or omissions which are committed by the Assured and/or the staff of the Assured in the professional conduct of their business as ———— (Consulting Engineers) and providing always that such claim or claims are made against the Assured during the currency of this policy.

If a claim is made for an error committed during the term of the policy but discovered after expiration, the loss, if any, is payable under the policy in force on the discovery date. If, for any reason, the insurance policy is not renewed or cancelled by either party, a period of twelve months for the discovery of any claim is granted without charge. If a longer discovery period is desired by the assured, there is a nominal additional premium. This provision is contained in Clause 8 of the policy as described hereafter.

II. This policy is also to indemnify the Assured against any claim or claims for breach of professional duty which may be made against the Assured during the currency of this policy arising from any negligent acts, errors, or omissions committed by any engineer and/or firm of engineers and architect and/or firm of architects employed by the Assured arising out of work carried out on behalf of the Assured and for which the Assured may be legally liable.

B. CONDITIONS

III. The liability, in all, of Underwriters during the period of this policy shall not exceed the sum specified in the schedule of this policy.

The maximum liability that can be written on a given risk is $1,000,000 and the minimum $50,000.

IV. The Assured shall bear the first $——— of each and every loss.

The deductible amounts vary from a minimum of $500 for small firms to $25,000 for the largest firms. The amount desired is indicated by the assured in his application. Premiums are discounted according to the amount of deductible.

V. The measure of loss shall be such amounts as may be assessed against the Assured either by arbitration, adjudication, or as the result of a law suit, together with all expenses incurred in connection therewith.

Expenses incurred in investigation and defense of claims are paid in full by the underwriters without application of the deductible amount if no damages are assessed against the assured.

VI. The Assured shall, as a condition precedent to their right to be indemnified under this policy, give to the Underwriters immediate notice in writing of any claim made upon them or intimation of a possible claim, and shall give to the Underwriters such information as the Underwriters may reasonably require in respect thereto, and any actual claim which may subsequently be made against the Assured as a result of the negligent acts, errors, or omissions which gave rise to the said intimation as to a possible claim shall, for the purpose of this policy, be treated as a claim during the currency thereof.

The underwriters require reasonably prompt notice of written or verbal claims or demands made upon the assured; they also request reports of any complaints which may reasonably be expected to result in claims subsequently.

VII. This policy is in excess of any other insurance or indemnity contracts and shall not be called upon in contribution but is only to pay any loss hereon if and so far as not recoverable under any other policy of insurance or indemnity contract. Underwriters' liability shall not be increased by reason of the inability of the Assured to collect from any other Insurers any amount which may have become due from them whether inability arises from insolvency of such other insurer or not.

VIII. It is warranted by the Assured that this policy shall be free of all claims not made against the Assured during the currency of this policy and for claims arising out of any negligent acts, errors, or omissions committed prior to the —— day of ———— provided, however, that in the event of cancellation or non-renewal, the indemnity granted by this policy shall be extended to cover the Assured in respect of any claim or claims which may be made against it during the period of 12 calendar months after the date of such cancellation or non-renewal but only in respect of any negligent acts, errors, or omissions committed prior to the date of such cancellation and/or non-renewal and subsequent to the ——— day of ————.

Errors committed prior to the effective date of insurance are not covered, regardless of when such errors are discovered or the claims arising from such error asserted against the insured.

of construction demanded by the owner, the policy may be extended to cover this additional liability.

These policies offer another important feature of protection which should be emphasized. Many engineering firms find it necessary to employ other firms to handle certain engineering or designing phases of a project. If such firms commit errors, the principal engineer, in all probability, will be held responsible under his contract. If he is found responsible, the policy will indemnify him for the errors committed by other firms he employs.

An outline of The Errors and Omissions policy now offered, with explanatory notes, is shown in the box. This policy has been purchased widely by the engineering firms in the New York territory during the past few years. Just over a year ago, however, the principles of group insurance were applied to the coverage because of the underwriting econo-

Now Available to Consulting Engineers

C. EXCLUSIONS

IX. The Underwriters shall not be liable in respect of any claim made against the Assured:

a. which is based on or is attributable to any failure on the part of the Assured to effect or maintain insurance.

This coverage is granted only to insurance brokers and agents.

b. in respect of or arising from:
1. Activities in connection with Fair or Exhibit Grounds.
2. The making of the following:
Surveys of sub-surface condition
Boundary surveys
Ground testing
3. Any supervision of the actual construction

c. in respect of or arising from activities in connection with tunnels and/or bridges and other similar work.

The exclusions under 9b and 9c may be deleted, if such coverage is required, by payment of an additional premium.

d. for any dishonest, fraudulent, criminal or malicious act or omissions or for libel, slander, assault or battery.

e. for bodily injury to, sickness, disease or death of any employee of the Assured while engaged in the employment of the Assured or for any obligation for which the insured may be held liable under any Workmen's Compensation Law.

Such insurance is available under separate Workmen's Compensation policies.

f. in connection with the ownership, maintenance, use or repair of any property, or the conduct of any business enterprise (excepting the business set forth in the proposal form attached hereto) that is wholly or partly owned, operated or managed by the Assured.

Such insurance is available under separate Public Liability policies.

g. for bodily injury, sickness, disease or death, injury to or destruction of property resulting from physical acts by the named Assured, his agents, or employees.

Such insurance also is afforded under separate Public Liability policies.

h. in respect of the ownership, maintenance, operation or use of any aircraft, boats, automobiles or vehicles of any kind by or in the interest of the insured.

Such insurance also is afforded under the appropriate forms of Liability policies.

i. in respect to the liability of others assumed by the Assured under any hold harmless contract or agreement.

Such agreements are occasionally found today in contracts with municipalities and other governmental bodies and obligate the assured to assume responsibilities for which otherwise the assured would not be legally liable. If such indemnity contracts are undertaken, the agreements should be submitted to the underwriters and endorsed upon the policy. An additional premium charge may be necessary.

X. This policy shall be cancelled at any time at the request of the Assured, or by the Underwriters, by giving ten day's notice of such cancellation.
If this policy shall be cancelled as hereinbefore provided, or become void or cease, the premium having been actually paid, the unearned portion shall be returned on surrender of this policy, the Underwriters retaining the customary short rate, except when this policy is cancelled by the Underwriters giving notice, they shall retain only pro rata premium. Notice of cancellation by the Underwriters shall be effective even though Underwriters make no payment or tender of return premium.

XI. It is further understood and agreed that the proposal form (a signed copy of which is attached hereto) completed and signed by the Assured and dated _____ shall be considered as being incorporated in the policy and the statements and answers therein shall form the basis of the Contract.

An application form is required each year in order that the underwriters may be furnished full information regarding the operations of the assured, the number and types of employees, the volume or value of work done during the preceding year and the amount of insurance (indemnity) desired. With this underwriting information as a basis, the policy is tailored to fit the requirements of each firm and proper premium determined. There is no increase or reduction in premium made during a given policy year regardless of changes occurring in the risk during that period.

mies that could be realized when The New York Association of Consulting Engineers arranged for a group Errors and Omissions policy to cover their members. After the first year a substantial reduction in policy premium has been made for subscribing firms. It is confidently expected that even greater savings will be possible during ensuing years. With this experience as a guide, a similar group policy now has been arranged for members of the American Institute of Consulting Engineers with headquarters in New York City.

Any consulting engineer or firm of engineers who are interested may obtain sample policies, rates, and application forms for individual policies of insurance or additional information regarding the group arrangement by writing The New York Association of Consulting Engineers, 220 East 42nd St., New York 17, New York. ▲▲

A Simplified System For

Filing Manufacturers' Literature

E. B. MANSFIELD
Consulting Engineer

SEVERAL MONTHS AGO (Feb. 1956) an article entitled "Improved Filing System for Catalogs" was published in CONSULTING ENGINEER. This article explained work done by the New York Association of Consulting Engineers to improve the American Institute of Architects' Standard Filing System. For consulting engineers this represents the start toward a universal index and filing system for catalogs, but it is only the beginning. We, and many other consulting engineers, have wrestled with this problem for years, and have found the existing systems unworkable.

Basic Idea Good

Actually, the ideas involved in the NYACE suggested filing method are good and would be the answer except that they are based on an indexing system designed not for use by consulting engineers but by architects. The Standard Filing System (AIA) includes several major categories and many classifications seldom of use to a consulting engineer, and it lists under very minor subcategories a number of items frequently specified by consultants. This is to be expected, for architects and engineers emphasize quite different aspects of construction.

Wrong Emphasis

For example, major division 28 in the AIA System is "Furnishings and Interior Decoration," while the next major division, number 29, is "Plumbing." Obviously, these two subjects are not of equal importance to the consulting engineer.

The consulting engineer needs a Standard Filing System developed for his own profession. It is impractical to try to adapt the architects' System to our use. However, this is not a simple project. The American Institute of Architects started on their System in 1920, and many hours have gone into its development. The preparation of a Standard Filing System for engineers would be an equally time-consum-

ing job, and its development and publication is not the type of work to be undertaken by one man, one firm, or even one regional society.*

Interim System

Meanwhile, until a Standard Filing System is prepared for engineers, our firm uses a system that suits our office excellently and could be adapted to any engineering office without difficulty. It originally was developed for use in connection with the design of a multimillion dollar industrial plant project. Since then we have used it for filing all of our catalogs and manufacturers' data sheets.

This system should be of help to competent, practicing engineers. A certain amount of knowledge of the subject and common sense is necessary for its effective use. As with any such system, it will work best if one person has the responsibility for cataloging and filing.

Just as in the AIA System, the major division titles are arranged in an order roughly corresponding to the order of work on a typical construction job. The subjects start with plot plans and site preparation and proceed through process equipment, structures, process services, and administrative services. Each major division is given a base number, and the various subdivisions are given numbers following their major division number. This break down into subdivisions can be carried as far as desired.

Process Division

The items under the major division, "Process" are to apply to the major process of the industry for which the engineering work is being done. If this point is missed, the catalog file will lose much of its value. Different industries will vary considerably as to the proportion of the process equipment coming under each of the subdivisions, but all the manufacturing and process plants on which we have worked can be fitted into the categories shown. In special fields, additional subdivisions can be added as required.

All our catalogs and manufacturers data are filed by this numbering system. A card is made out for each catalog, and a notation is made on this card in the event that the catalog is a large one that must be kept in a bookcase rather than in a file cabinet. Catalogs covering several detailed subjects can be filed under a major division number whereas those dealing with only one product are filed under a subdivision number.

NUMBERED FILING SYSTEM

Subject Divisions	Subject Numbers
General	100
Plot plans, property surveys, etc.	101
Site preparation, surface drainage, grading	102
Fences & security precautions	103
Plant roads & railroads	104
Construction equipment	105
Process	200
Materials handling	201
Fabricating, forge, foundry	202
Machining, finishing	203
Mixing, blending, compounding	204
Molding, pressing, curing	205
Painting, trimming, packaging	206
Structures	300
Office building	301
Production building	302
Shop building	303
Service buildings other than shop	304
Yard structures	305
Employee's facilities	306
Process Services	400
Electrical	401
Hydraulic	402
Fire system	403
Sanitary water	404
Steam	405
Air	406
Gas	407
Refrigeration	408
Air conditioning, heating, & ventilation	409
Sewers, drains, & disposal plants	410
Shop & maintenance equipment	411
Instrumentation & controls	412
Administrative Services	500
Communications	501
Office equipment	502
Hospital dispensary & safety equipment	503
Laboratory equipment	504
Miscellaneous	505
Engineering	600
Progress reports	601
Trip & contact reports	602
Procedure	603
Print transmittal	604
Clippings, etc.	605
Engineering costs	610

This system, while it works well for us, is not offered as being complete or suited to the needs of all consulting engineers. It might, however, be used as a starting point for a Standard System for engineers. If this happy goal could be realized, manufacturers might be willing to print a number on each catalog and perhaps furnish a printed card for the consulting engineer's card file.

In our opinion, the completion and adoption of some good Standard Filing System for manufacturers' catalogs and data sheets would be an extremely important contribution to the profession. ▲▲

*Editor's note: It is difficult to say just what organization would be qualified to prepare such a Standard System. It could not be done by any one of the Founder Societies, for the System would have to cover all branches of engineering; not civil, electrical, or mechanical, alone. The American Institute of Consulting Engineers does not have sufficient staff, and the recently formed Consulting Engineers Council does not yet have any staff. Perhaps the job could be done by the National Society of Professional Engineers through their newly organized Consulting Engineer Functional Group, though it is not yet clear whether this type of project would be of interest to them.

Anemostat

INDUSTRIAL AREAS ARE AIR CONDITIONED FOR BOTH PROCESS CONTROL AND EMPLOYEE COMFORT.

Suggestions For the Selection of

Industrial Air Conditioning

FRANCIS K. GREEN, P.E., Air Research Associates

FOR MANY YEARS after its introduction, industrial air conditioning was directed almost exclusively toward the correction of atmospheric conditions regarded as unfavorable to product quality. Its first widespread use occurred in the textile industry where humidity has a pronounced effect on processing conditions. The accumulation of electrostatic charges on the surface of textiles and fiber "wildness" are conditions affected by humidity. The correction of these conditions justified the rapid growth of air conditioning in this field where it is now a standard element in the production scheme.

Other Typical Fields

Flight propulsion laboratories employ air conditioning in their elaborate control rooms to protect highly sensitive instruments from atmospheric disturbance or contamination. A number of steel manufacturers have air conditioned the cabs of their cranes to protect operators from the intense heat of furnaces. Daily newspapers, in common with much of the printing industry, have found air conditioning an answer to the problems created by the accumulation of electrostatic charges on paper moving at high speeds. In color process work, air conditioning is an absolute necessity to obtain proper register, since even small variations in temperature can cause significant shrinkage in the printing paper.

Air conditioning is used to remove an oil mist raised by the pneumatic lubrication of rivet machines and the high rotative speeds of screw machine heads. It also is used extensively by manufacturers of ball bearings, carborundum paper, electrical conductors, felt goods, jewelry, laminated glass, leather, matches, pharmaceuticals, sensitized photographic products, abrasives, and optical goods. Processors of tobacco, bananas, holly, mushrooms, plywood, and silk use it in their operations. It is used in drafting rooms, machine shops, gage rooms, instrument assembly areas, mines, wind tunnels, and biological laboratories. And it is used by the telephone industry to handle the heat loads in transmission stations. Frequently air conditioning also is essential to the successful operation of large computers and other electronic devices now in great demand for plant and office process operations.

Air conditioning concerned with the human element in production is a fairly new field of study. Industry has become more conscious of the correla-

tion between comfort air conditioning and improved production records. Evidence of this correlation is accumulating rapidly and greater recognition is being given to air conditioning as an important aid.

Applications in Manufacturing

The heat load generated by production machinery must receive proper attention if the air conditioning system is to be successful. This load varies over a wide range, sometimes accounting for half of the total heat load. In industrial buildings, the amount of air required usually is determined by the amount of exhaust, which in turn depends on the heat generated by the machines plus that generated by the workers. Both these quantities are definitely calculable, although they may change as production machinery is added or removed.

Windowless Plants

There is a growing trend toward windowless plants. They can be conditioned by the conventional method, using a central machinery room or building where a chilled medium and a heating medium are produced and pumped to many air-handling units, each of which handles an individual area or zone. The zone system also can be applied. Cooling machinery, suitably sized for each zone, is located within that area. The zone unit system saves one heat exchange. Other advantages are the saving in first and operating costs of auxiliary equipment, such as pumps and insulated piping. The air-handling units for each zone generally are located in roof trusses or in penthouses on the roof. Both of these methods (central and zone) have been used extensively for large-area, single-floor windowless plants.

Selecting An Air Conditioning System

In specifying an air conditioning system, the consulting engineer has several basically different systems from which to choose.

- Package units
- Central plant (low velocity)
- Central plant (high velocity)
- Induction system
- Chilled water perimeter system

In some instances, two or more of these systems can be used in combination. Purpose, space, and the physical condition of a building are considerations that determine the choice of a system or systems.

A significant fact stands out. Today you can select a system to fit a client's need. Not too long ago, the application had to fit the only air conditioning systems available. But with the advent of high velocity systems, efficient air diffusers, and other technological progress, it is now possible to fit an air conditioning system to the need.

The use of high velocities in air conditioning is the most recent and one of the most important developments. Efficient air distribution is another important development, and it is regarded by many as a key factor in the increased use of air conditioning.

Central Systems

The central system is a direct or indirect system of heating, ventilating, or air conditioning in which the air is treated or handled by equipment located outside the rooms served, usually at a central location, and is conveyed to and from the rooms by means of a fan and a system of distributing ducts. In a direct expansion system, the refrigerant is used to cool the air directly, while in the indirect system, the refrigerant cools water or brine, which then is pumped into the cooling coils.

Central systems offer better integration with overall building plans. Control of temperature and humidity is better. Air filtration is centralized, which cuts down on maintenance. In addition, better filters can be used. Air may be distributed to any desired space. When zone control is desired, the central system affords maximum use of equipment. The system is suitable for year-round conditioning for both heating and cooling. And it has a useful life of 30 years—about twice as long as its nearest competitor.

Principal applications are in new buildings where a capacity of 100 tons or more is required and in existing buildings where long-term investment is justified. Where year-round air conditioning is required, the central system is the most desirable. Where replacement of the building heating system is considered with air cooling, the two may be combined at a considerable saving.

There are four principal variations of the central system that should be considered—the high velocity (single and dual duct) system, the low velocity system, the chilled water perimeter system, and the induction system.

High Velocity

High velocity air conditioning is the conditioning of room or zone air by a supply stream at a speed of

Anemostat

TEXTILE WEAVE ROOMS NEED AIR CONDITIONING FOR EFFICIENT OPERATION. HUMIDITY CONTROL IS VITAL.

Anemostat

FILTERED AIR AND CONTROLLED TEMPERATURE AND HUMIDITY ARE NEEDED IN INDUSTRIAL LABORATORIES.

from 2500 to 6000 fpm and up. This high velocity permits a drastic reduction in the size of ducting, sometimes by as much as half. It saves considerable space in new construction and reduces the installation cost of a system in an existing structure. Both single and dual duct systems are used.

The single duct system supplies a mixture of outdoor air and return air, which is filtered, cooled, and delivered to the conditioned spaces. The dual duct system operates through two parallel ducts carrying air at two temperature levels. These levels are mixed at the discharge outlet to provide the desired temperature. Thus, each conditioned space has individual temperature control, and this is the primary justification for dual duct conditioning.

Dual duct systems were always popular in the western states and have increased in popularity throughout the entire country and Canada with the advent of high velocity, high temperature differential systems. Among the various kinds of outlet units, the under-the-window perimeter units usually are used. They are best suited for exterior-zone, year-round air conditioning. In many installations, the 100-percent induction type diffuser is used, as it provides good diffusion on both the heating and cooling cycles. The units provide ample ventilation air and can be used without refrigeration equipment.

When precise individual room control is not required, single duct, under-the-window, induction high velocity units often are installed. It should be noted that high velocity under-the-window units are being used in low or single-story office buildings as well as in the multistory type. High velocity ducts can be used for horizontal as well as vertical distribution of air.

Various applications of dual duct high velocity systems are being used currently. Among them is the individual unit system, which provides precise control. A single thermostat can control as many as four diffusers in a large office, or a single thermostat can be used for a lone diffuser in a smaller office.

Low Velocity

The low velocity system conditions room or zone air by a supply stream moving through ducts at a speed of 2000 fpm or less. Its main advantage is lower operating costs. Major disadvantages are the need for more duct space and greater alterations in existing building structures. This is the system that has been used primarily from the advent of air conditioning to the present day.

Low and High Velocity Contrasted

The basic objective of the high velocity system is to remove some of the disadvantages of low velocity systems. When installed in existing spaces, the amount of cutting and patching required by a low velocity system is greater than for high velocity. When installed in a new building, a low velocity system will require more space and add more to the height of the structure than a high velocity system —as much as two feet in single-story buildings—and

obviously more insulating material will be required.

A low velocity system cannot achieve the same uniform distribution and movement of room air as a high velocity system. High outlet velocities also facilitate perimeter zone control without the use of space consuming window units and perimeter ducts. High velocity systems permit higher temperature differentials, i.e., a greater difference in the temperature of chilled air needed to cool a given space.

Chilled Water Perimeter System

The chilled water perimeter system came into widespread use shortly after World War II and is still quite popular. During the summer, chilled water is pumped to individual air handling units in rooms, and primary air is supplied to these units by a small, low velocity plant. The temperature in any room, therefore, depends on the temperature of the chilled water as well as that of the primary air. A significant advantage of this system is its ability to heat one room and cool another at the same time, since temperature regulation in a conditioned area is brought about by varying the supplies of chilled water or primary air.

Induction System

The induction system, which came into use shortly after the chilled water system, is actually a type of high velocity system, but it is considered separately because its use of a secondary room air coil in each conditioned area involves a substantially different principle. As in the chilled water perimeter system, chilled water is circulated throughout the system, with coils at each terminal unit.

Instead of a fan, however, a system of high velocity ductwork supplies air to the various rooms under high pressure. The induction takes place at the terminal unit, where room air is induced into the unit, mixed with the primary air, and again discharged into the room. The individual units are located under the windows of the conditioned spaces. A disadvantage of this system is the presence of filters in each unit, which of course collect a good deal of dust and require frequent maintenance. In both the chilled water perimeter system and the induction system, the coil also must be cleaned to prevent the accumulation of moisture and excessive odors in the conditioned areas.

First Cost and Operating Cost

The first cost of a low velocity system is about the same as that of a high velocity system. It should be noted, however, that the building alteration costs incurred in installing low velocity systems in older buildings frequently are excessive; in such cases the use of higher velocities would represent a substantial saving. The induction system is the most expensive, and the chilled water perimeter system is just below it in costs.

More fan horsepower is required to push air at higher velocities, so a high velocity system is usually more expensive to operate unless there are compensating factors such as high temperature differentials between room air and supply air, which would require less fan horsepower. The final difference in costs will depend on the care given to duct layout, on the operating velocity of the system, and on the temperature differentials in effect.

The Package System

The package type of air conditioning is distinguished from the others in that the equipment is self-contained and supplies conditioning only to the immediate area. The window and cabinet units are the familiar examples of the unit system. They are limited in industrial applications because maintenance is costly, and their life is short.

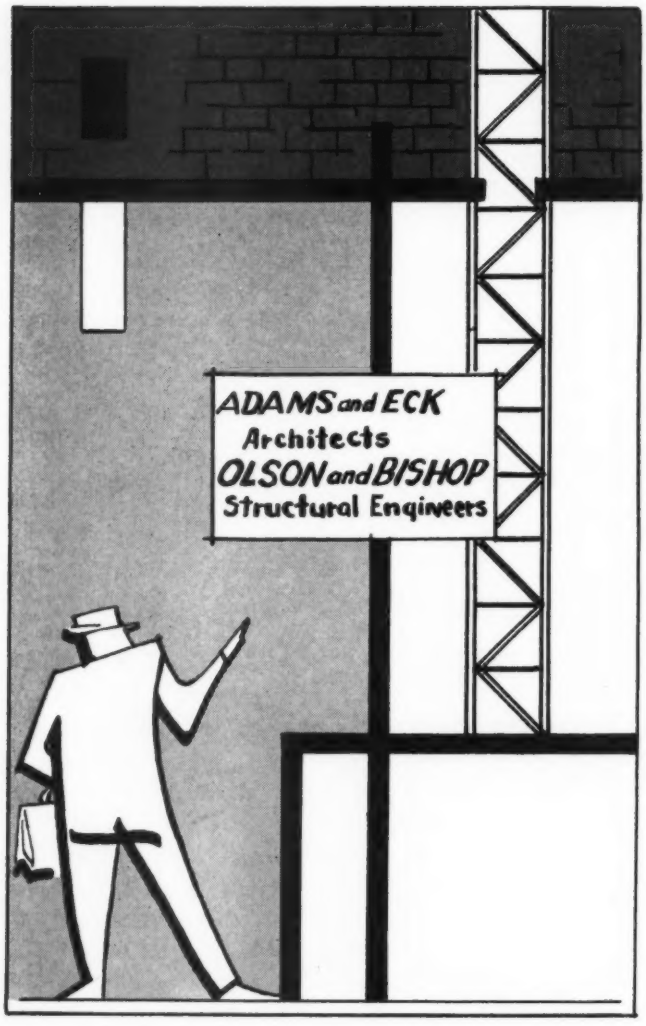
Diffusion

As suggested earlier, diffusion is a vital element of any air conditioning system, whether high or low velocity. The greatest care must be given to the selection of diffusion equipment. Drafty, turbulent air and pockets of stale air could nullify the value of the entire system.

This is true generally, and it is particularly true in industry, where some product parts cannot be made to required tolerances if atmospheric conditions are not constant throughout the shop. The problem may be further complicated when production of certain parts requires several days. The large gears used for marine propulsion offer an example of this problem. They sometimes require as many as 17 days for hobbing.

The aspirating diffuser is effective in discharging air into an occupied area in a planned air pattern. This type embodies both primary and secondary induction characteristics. All diffusers have secondary induction to some extent, i.e., the primary air stream from the outlet induces or entrains room air. However, aspirating equipment performs this function and also draws room air into the outlet where it is further mixed. Since the degree of uniformity in air motion and distribution are primarily functions of induction, the importance of aspirating equipment can be readily appreciated. Since the development of the aspirating diffuser, greater temperature differentials are possible than when the industry had to rely on grilles.

It is apparent from the few examples cited here that air conditioning is now an increasingly important factor in plant production and personnel management. It has been widely recognized that improvement in climatic conditions in a plant tends to augment the efficiency of workers. Engineering progress made by the air conditioning industry now makes it possible to design systems to meet a much wider range of application than ever before. ▲▲



The Consulting Structural Engineer

MILO S. KETCHUM
Ketchum & Konkel, Consulting Engineers

THE PRIMARY FUNCTION of the consulting structural engineer in the building field is to prepare designs and working drawings for the structural portion of the architect's work. He may assist in preliminary studies of framing and prepare preliminary estimates, depending on the engineer-architect relationship. Also, he assists in the compilation of specifications and checks shop drawings for structural steel or concrete reinforcing. The engineer may or may not do field supervision of construction depending on his agreement with the architect. Undoubtedly, the most important phase of structural supervision is the checking of reinforcing bar placing. On concrete placing and structural steel erection, it is not so necessary to have technical supervision.

Architects Not Trained

In some areas of this country there are very few consulting structural engineers because most of the local architects have their own structural design departments with hired employees. Many architects with small practices do their own structural design. Structural engineers must look with misgiving on the designs of these men because architects usually are not trained in this field.

The average structural office is probably quite small, consisting of no more than a principal and perhaps five employees. It is strictly a service organization, and its personnel must be available at all times to assist the architect. If the engineer has several clients, the work tends to flow through the office in a fairly uniform manner because gaps in the schedule of one architect will be made up by work for another architect. The highs and lows of work thereby are smoothed out in comparison to the schedules of architects.

There are two basic patterns for office organization. First, both engineers and structural draftsmen may be hired with the engineers doing all the design work and the draftsmen making the finished drawings. This method is particularly suitable in large metropolitan areas where there is a regular labor market for structural draftsmen. The other pattern is to employ only graduate engineers who do both engineering and drafting. If there are a large number of small jobs, this system is more efficient even though the rate per hour is higher for engineers than for draftsmen. It is not so efficient on large projects if the engineer is used too much of the time on subengineering work.

There are two sources of supply for engineers: (1) graduates in the civil engineering curriculum, and (2) graduates in architectural engineering. The architectural engineers generally are superior to civil engineers for structural offices, for the civils have had to spend much of their time in school on courses not germane to the structure or architecture of buildings. Also, the civils have not been given good enough courses in drafting, and by their senior year they have lost any desire to excel in this field. It takes a full year for the civils to catch up with the architectural graduates in drafting

proficiency and knowledge of building construction.

Not enough young engineers know it, but there can be little doubt that a consultant's office is the best place for a young engineer to start. He will be working under the most skilled men in the profession, and he will get more responsibility under proper supervision than in any other situation where engineers are employed.

Fee Schedules

Fees received by structural engineers vary with supply and demand, as any other commodity on a free market. An excess of engineers, of course, tends to bring the market down. Fees are usually lower in the large metropolitan areas.

The usual fee is based on a percentage of the total cost of the building, not including the mechanical and electrical subcontracts. I know of rates of from six-tenths of one percent (0.6 percent) as the standard rate in metropolitan centers, to one and a quarter percent (1.25 percent) in other areas. It is not common practice to base the fee on a percentage of the cost of the structural work alone because it is difficult to separate this as an item in the contractor's bid. This is in contrast to mechanical engineers' fees, which are based on a single bid by the mechanical contractor. Most structural engineers would prefer a fee based on a percentage of total cost of construction including mechanical and electrical because coordination of the mechanical work with the structural on a large air-conditioned building will cost the structural engineer more than any other single item.

On large projects where the architect must trim his fee, the structural engineer also is expected to take less but not necessarily in the same proportion. Also, on simple wall bearing structures, the fee may be less and often will be negotiated.

There is always some work in a structural engineer's office that is not tied to a percentage fee, and this must be done on some kind of hourly basis. One arrangement is to charge the client the hourly salary of the staff member assigned, plus a percentage for overhead and profit. This percentage varies from 60 to 125 percent with 100 percent being an optimum figure. This includes any time spent by the principal, who usually assigns himself a rate slightly above the highest paid staff member.

Sometimes clients prefer to have their work done on a lump sum bid basis, and then it is up to the engineer to estimate the amount of time required. One method is to use a rate per square foot of drawing after estimating the number of sheets required. In our office this rate will vary from $60 to $100 per square foot for complex, tightly packed drawings, which fee covers all services including preliminary conferences, design, working drawings, and checking of shop details.

Competition with the structural consultant comes principally from the architect who has his own structural engineer. To compete, the consultant must be one and one-half times as efficient considering that he must receive a profit in addition to the overhead the architect also would have to pay. The real difficulty of the architect in hiring his own staff is that it is not usually possible for him to know whether or not his structural engineers are competent.

Another source of competition to the consultant is the engineer who works for a commercial organization or the government during the day and does structural design in the evenings and week ends. He sells his services very cheaply and appeals to the architect who works by himself and must keep his budget low. Also, materials firms, such as reinforcing bar or structural steel fabricators furnish "free" engineering services for using their products. This is not as much of a problem to the structural engineer, however, as it is to the mechanical engineer who deals with a much wider variety of equipment manufactured by highly competitive firms.

Relationship to Architect

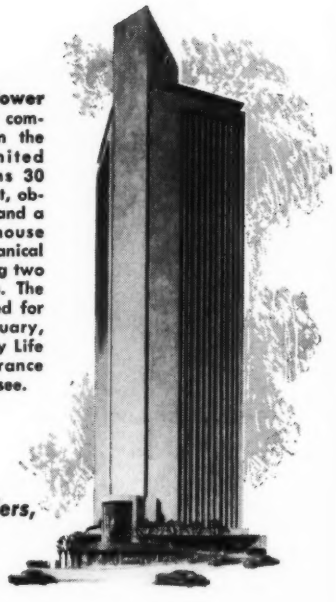
The structural engineer's relationship to the architect is similar to that of the contractor to the subcontractor. The sub is used only because he can do a better job at less cost and because he has the knowledge and personnel to do the work. For these same reasons, the architect engages a consulting structural engineer. Only rarely is the engineer hired by the owner under a separate contract.

Some architects use the services of a consulting structural engineer in the creative process of designing a building, but most use the engineer merely to size beams and to prepare the structural drawings.

The ideal architect, so far as the engineer is concerned, will call in the engineer for consultation as soon as he starts on a project and before he has preconceived ideas of structure. A conference will be held with the architect, all of the engineers, and perhaps a contractor. All the problems involving the structure will be discussed thoroughly, and each member of the team will understand the problems of the others.

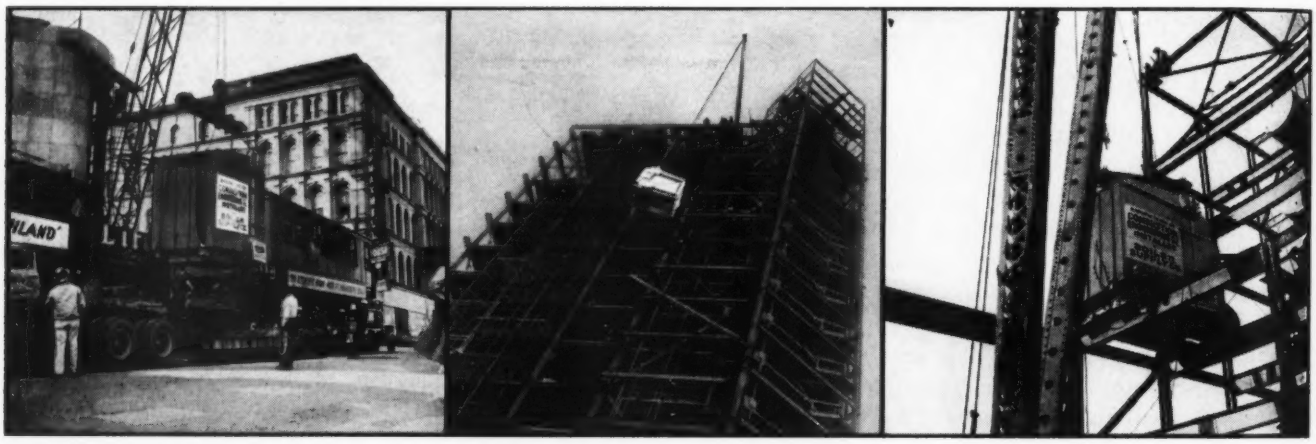
While the ideal architect will have a sense of structure, he will not necessarily be able to determine the dimensions of the component elements. He should not make unreasonable demands on the dimensions of the structure purely from his own intuition. He will allow the structural engineer to make cost studies so that decisions can be made between various structural systems. He will adapt a reasonable timetable for completion of the drawings and will keep the engineer informed as to the revisions in the timetable. He will properly coordinate the work of the other engineers. He will allow a proper period of time for checking the

You can put a VP boiler ANYWHERE!



Life and Casualty Tower will be the tallest commercial structure in the southeastern United States. It contains 30 floors plus basement, observation platform and a three-story penthouse containing the mechanical equipment—including two VP package boilers. The building is scheduled for occupancy in January, 1957. It is owned by Life and Casualty Insurance Company of Tennessee.

. . . anywhere the floor-loading's adequate, of course. In Nashville's nearly-finished Life and Casualty Tower, two Combustion Engineering Package Boilers, Type VP, were installed in a 32nd-floor penthouse — nearly 400 feet above the street. The pictures show how the job was done.



Take It Away—First of two VP Boilers—27,000 pounds—clears the truck bed in the first step of its 32-story journey. VP Boilers come fully assembled, ready for water, rail or road shipment anywhere in the world.

Almost Home—This VP has probably shattered the altitude record for boilers now—and it has another 30 or 40 feet yet to go. That's one of the advantages of the VP. You pick the spot and the rigging boys will find a way to move it in.

Boiler in a Penthouse—Now it's almost settled in its permanent skytop home; about set to bring up number 2. When the floor is ready, they'll hook up fuel, water and the job's done. They'll burn gas in these boilers, with oil as stand-by.

The completely shop-assembled VP Boiler, shown at left, is available in fourteen sizes from 4,000 to 40,000 lb steam per hr ... for operating pressures up to 500 psi ... for pressure firing of liquid or gaseous fuels. The VP Boiler has more water-cooled area per cubic foot of furnace volume than any other boiler of its size and type. The larger lower drum—30-inch diameter—permits a simple, symmetrical tube arrangement ... greater water storage capacity ... easy access for washing down or inspection. A low speed centrifugal fan which is exceptionally quiet in operation is standard equipment. The simple baffle arrangement results in low draft loss ... simple soot blowing ... no dead pockets ... high heat absorption. The VP is enclosed in a reinforced, gas-tight, welded steel casing, and shipped completely assembled with firing equipment, fittings and forced draft fan. For foundation, the VP Boiler requires only a simple concrete slab.

C-E **COMBUSTION ENGINEERING**

B-928A

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complete set of drawings so any discrepancies are eliminated. This last check makes the difference between an excellent and a poor set of contract documents.

Although the structural engineer needs very little promotion ability to become moderately successful, like a doctor, he needs a good bedside manner. He must make each architect think that the particular job at hand is the only one of importance in the office and that he would rather do this architect's work than any other. The architect is a sensitive, creative individual, and he needs all the psychological bolstering that the structural engineer can give him. With relation to the architect, the structural engineer is in an entirely different position from the mechanical and electrical engineer. Structure lies at the heart of architecture, or said another way, structure is architecture. The engineer, in devising a structural system, is doing what the architect does not have the ability and training to do. The frame thus devised will do much to make or mar the appearance and utility of the building. This is especially true of the more modern buildings where the structural frame often is used as the visible exterior or interior of the building.

Must Know Detailing

The structural engineer must know and understand architectural detailing as fully as does the architect, since he has to design the skeleton of the building. His training is such that he is better able to understand the purpose and layout of details. If a structural engineer has a number of clients, he will see more architecture than the architect who works only in one or two offices. No two architects detail the same way or use the same materials. Practices that are sacred to one firm will be scorned by another.

Architecture is essentially inbred, in that there is very little circulation of detailing practices. The structural engineer sees all these various methods of design and detailing and gets to know more about the detailing phase of architecture than do his architect-clients. He reads the architectural magazines and studies modern design. Gradually he begins to feel that perhaps he should have been an architect, since he could do so much better if he only had a chance.

Frustrated

The best structural engineers are frustrated architects in the same sense that the best architects are frustrated structural engineers. The best new architectural designs are nearly all based on a new, fresh structural system that no one else has exploited.

Occasionally the structural engineer has a chance to prepare all the plans for an industrial building. It is probably a job that one of his clients could not get, or one that would never reach an architect anyway. Here he has a chance to find out what he can do. He discovers, much to his surprise, that he can draw plans for buildings, and if there is any budget at all for style, the looks of the building will not be half bad. He keeps the building much simpler than would an architect. To the engineer, the square box, the most efficient container, is not necessarily an anathema.

Professional Representation

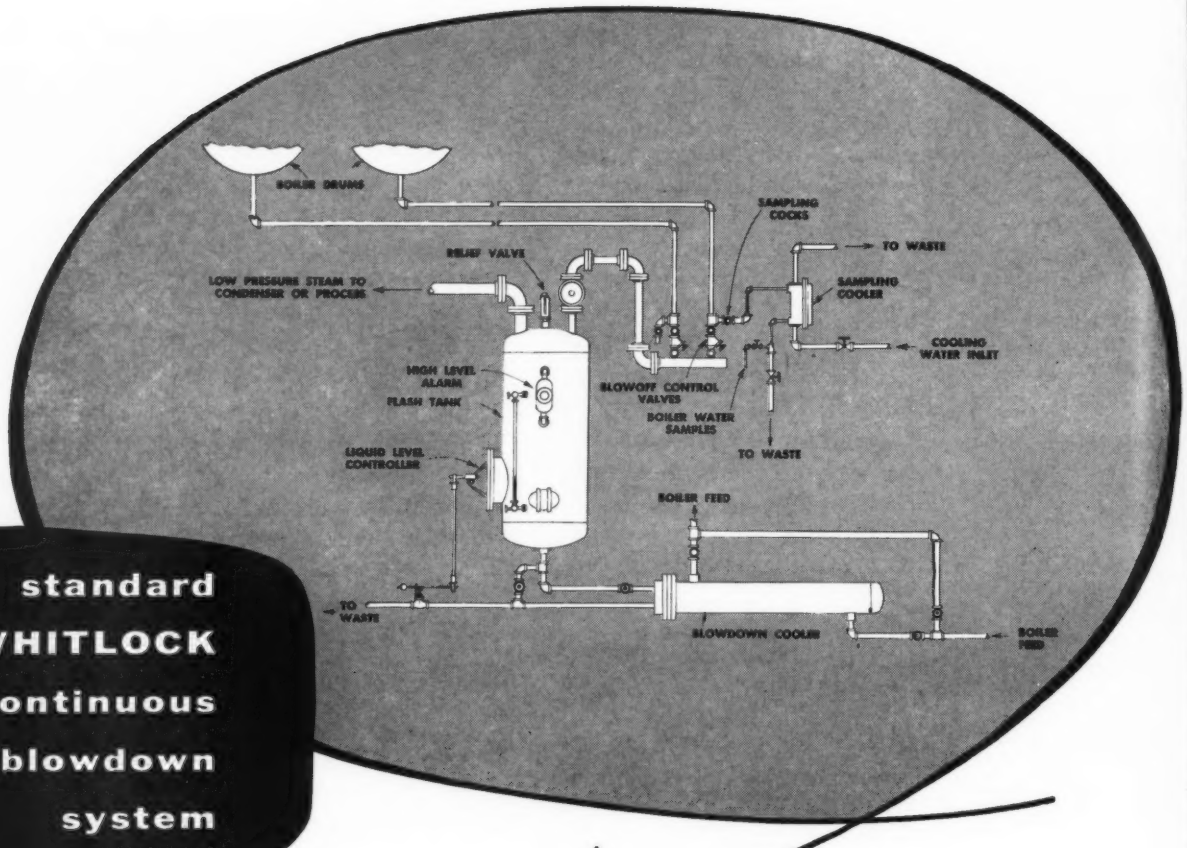
All of what has been said leads up to a picture of a slightly frustrated individual, which is probably true. The structural engineer, as such, has very little professional representation. Actually, there is no profession of "structural engineering." Except for a few schools, an engineer cannot graduate as a structural engineer.

No national society represents only the interests of structural engineers. However, there is a "Structural Engineers Association of California" and an "International Association for Bridge and Structural Engineering." A national technical society might give the structural engineer more prestige, but its formation would mean breaking away from the American Society of Civil Engineers. Great Britain has such an organization, the "Institution of Structural Engineers," founded in 1908.

A strong professional organization of structural engineering consultants might be able to help the engineer in the registration situation. In California, where there is such an organization, he is in the most favorable position. Some of this, of course, may be due to the need in California for design of buildings against earthquakes.

As most registration laws now stand, it is not necessary to retain an engineer for the preparation of plans for most building; the architect supposedly is qualified to perform this work. But many practicing architects freely admit that they do not know and do not care to know how to calculate strength of structural members. Therefore, the structural engineer believes that for the health, safety, and welfare of the community, the structure of public and semipublic buildings should be designed by a registered structural engineer. There is a far better case for this change in registration laws than for almost any other problem in engineering registration. It is doubtful, however, if engineers other than the structurals will concede this point unless there is strong pressure.

The answer probably lies in an association interested in the problems of independent consulting engineers who work as structural designers. The newly formed Consulting Engineers Council along with its state and regional member associations may be of some help. It will be some time before we know. ▲▲



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European Engineers Visit United States

ENGINEERS FROM SIX EUROPEAN COUNTRIES VISITED THE U. S. IN JUNE TO FIND OUT HOW OUR CONSULTING ENGINEER FIRMS WORK. HERE THEY ARE SHOWN IN OFFICE OF DETROIT EDISON.

STAFF REPORT

A GROUP OF 17 ENGINEERS, from six European countries, visited the United States from May 15-June 30. The object of the visit was to study the role and methods of work of consulting engineering firms. The tour was conducted under the direction of the International Cooperation Administration but the European engineers paid all their own expenses.

The first stop of the group was in New York, where they spent the morning with the Association of Consulting Management Engineers, had lunch with the New York State Society of Professional Engineers, and then met in the afternoon with the New York Association of Consulting Engineers. Next, they had a morning session with the American Society of Civil Engineers, at which there were representatives of the American Institute of Consulting Engineers, the American Institute of Electrical Engineers, and the American Society of Mechanical Engineers. By that time, it was, as one of the consulting engineers from Ireland put it, "a bit hard to determine which society represented whom and why."

To add to the confusion, of the 17 members of the visiting group six were consulting engineers while the remaining eleven were contractors, manufacturer's representatives, or government employees. This mixture made it difficult for the ICA to decide exactly what would interest them, so they brought in every firm or society in the New York area that seemed to have any relation.

On the remaining days in New York, the group visited the Guaranty Trust Company; Stevenson, Jordan & Harrison, Inc., Management Consultants; the AFL-CIO; Knappen-Tippetts-Abbett-McCarthy; Ebasco; and Stone and Webster. Then they were off to Niagara-Mohawk Power Corporation for visits at the Huntley, Adams, and Schoellkopf Stations.

In Detroit they visited the Detroit Edison Co. and also conferred with officials of Giffels & Vallet; then went on to Chicago for a meeting with the Chicago Association of Consulting Engineers and a visit to DeLeuw, Cather & Co. By this time the consulting engineers in the party had a good idea of what they wanted to do and see, so the group split, with the consulting engineers going to Minneapolis for a visit with the Minnesota Association of Consulting Engineers while the other engineers went to Knoxville, for a look at TVA.

The consultants had a remarkably satisfactory visit in Minneapolis, although the lone contractor in that party said that he felt like "a lion in a den of Daniels." The Minnesota Association sent representatives to meet them at the train and arranged to look out for their needs during the three day visit. Here the group visited a number of consultants' offices and had an opportunity to question the principals in detail as to practices in this country. They agreed that they could not have asked for a finer reception than they received in Minneapolis.

Back in Washington, for a report on their travels, each member of the group stated that the visit had been worth while, but they pointed out that such visits would be more effective if the groups could be limited to engineers with common interests rather than mixing consultants, engineers with industrial firms, contractors, and government engineers. Then it would be possible to provide a less confusing itinerary.

The most common complaint had to do with the insufficient amount of money allowed for the trip. Most European countries do not let their nationals take out of the country more than a very limited amount of currency. After consultation with the International Cooperation Administration this amount was variously determined at from $12 to $16 per day. Since these engineers were spending their own money and since the hotels in which they stayed in some instances charged almost as much as their daily allowance, the members of the group did not feel particularly flush with cash. They strongly recommended that in the event of future missions, the U. S. Government make it clear to their governments that it costs more than $12 per day to travel in the U. S.

However, at the Washington Summary Meeting, every one of the visitors expressed warm thanks for the opportunity to visit in this country and stated that they were looking forward to a return trip.

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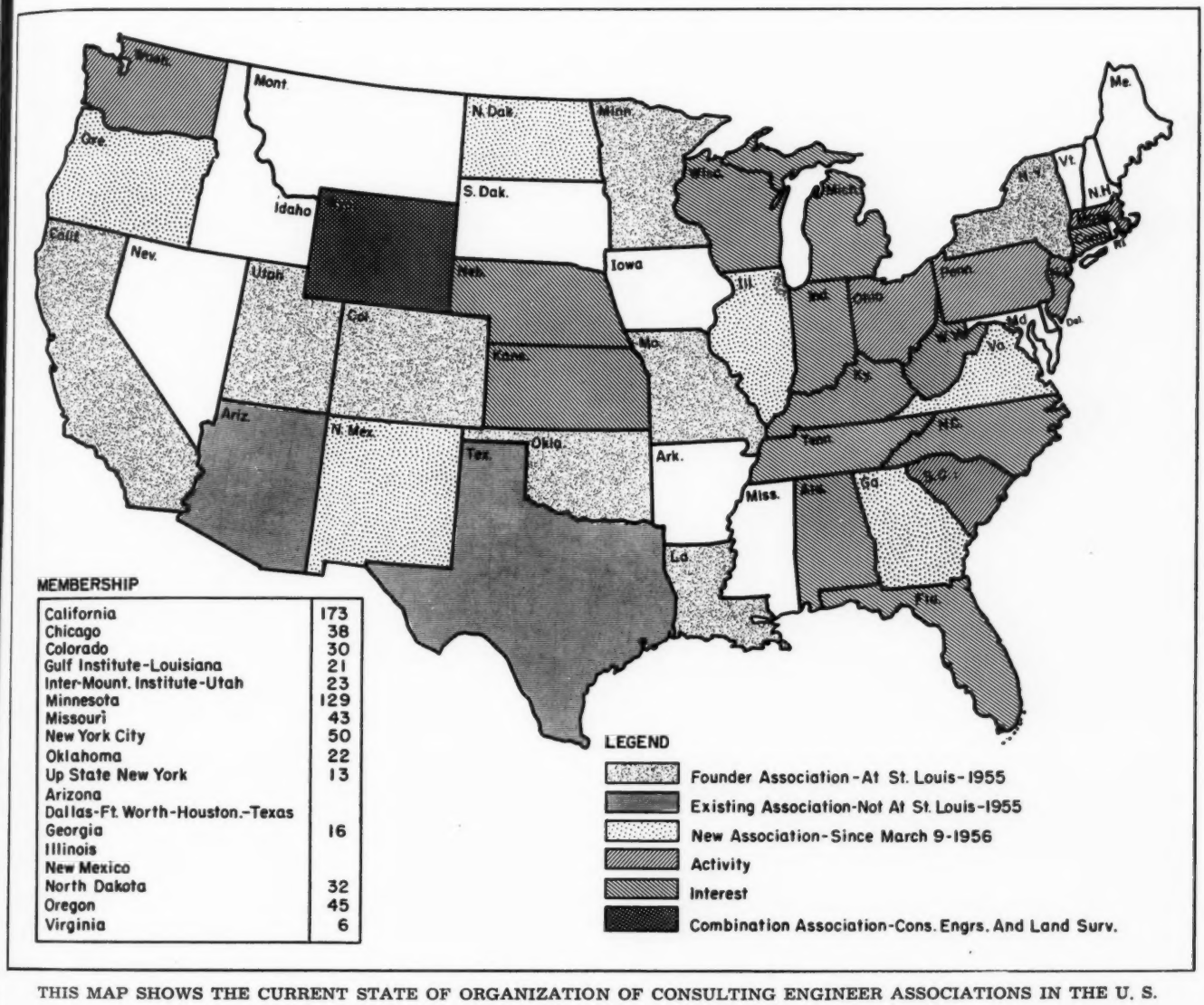


THIS MAP SHOWS THE CURRENT STATE OF ORGANIZATION OF CONSULTING ENGINEER ASSOCIATIONS IN THE U. S.

Consulting Engineer Council Formed

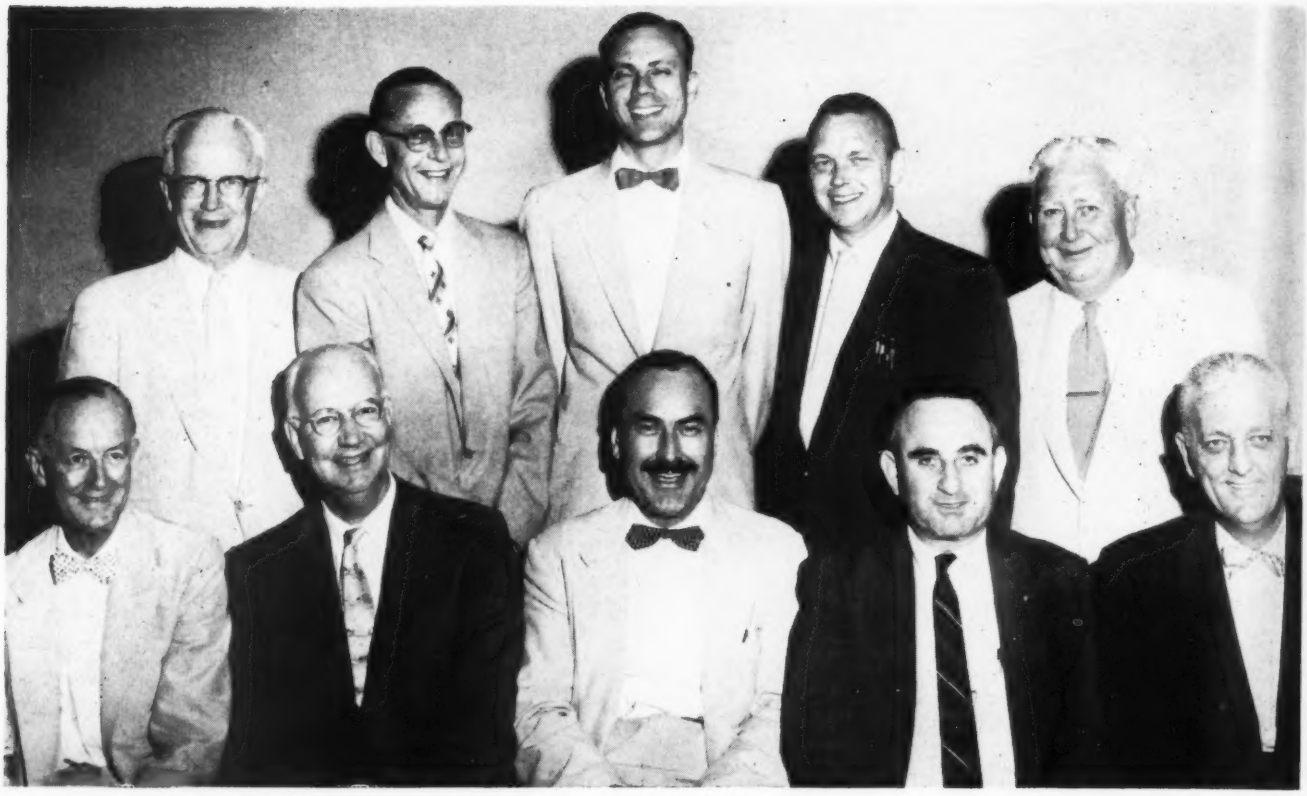
AN ORGANIZATION known as the Consulting Engineers Council was officially brought into being at a convention held in Tulsa, July 6-7. This new federation, made up of associations of consulting engineers, is an outgrowth of a preliminary meeting held in St. Louis, last October. The ten founders are associations of independent consulting engineers in California, Chicago, Colorado, Louisiana, Minnesota, Missouri, New York City, Upstate New York, Oklahoma, and Utah.

The convention selected the name, Consulting Engineers Council, adopted a constitution and by-laws, and elected officers. The board of directors, as provided in the constitution, consists of one delegate from each of the member associations.

John K. M. Pryke, New York City, was elected president of the new organization. Other officers elected are Charles C. Pate, Tulsa, Okla., first vice president; Bernard Dornblatt, New Orleans, La., second vice president; Edward J. Wolff, Chicago, Ill., secretary; and William C. E. Becker, St. Louis, Mo., treasurer.

The Board of Directors, in addition to the officers, includes George W. Poulsen, Jr., Salt Lake City, Utah; K. J. Murray, Denver, Colo.; Ralph M. Westcott, Los Angeles, Calif.; Howard F. Eckerlin, Syracuse, N.Y.; T. E. Roche, Minneapolis, Minn.; George T. Toman, Mandan, N.D.; and R. Berl Elder, Macon, Ga. North Dakota and Georgia were admitted as charter members following the adoption of the constitution and by-laws.

The first session of the convention, on July 6, was devoted primarily to discussion of the proposed



OFFICERS AND MEMBERS OF THE BOARD OF THE CONSULTING ENGINEERS COUNCIL. STANDING—TOM ROCHE, MINN.; RALPH WESTCOTT, CALIF.; GEORGE POULSEN, UTAH; HOWARD ECKERLIN, N.Y.; K. J. MURRAY, COLO. SEATED—WILLIAM BECKER, MO.; C. C. PATE, OKLA.; JOHN PRYKE, N. Y. CITY; BERNARD DORNBLATT, LA.; AND EDWARD WOLFF, CHICAGO.

Objectives of the Council

To protect the public, promote harmony, cooperation and mutual understanding among independent consulting engineers engaged in private practice.

To cooperate with other organizations, public bodies, etc. in all matters of common interest as may arise from time to time.

To insure that the high ethical professional standards required of an independent consulting engineer are maintained in accordance with the "Code of Ethics" of the Council.

To promote the professional and economic welfare of the members comprising the Council.

To act as a clearing house and information center as between such members on all matters of mutual interest and as between the members and the general public.

Incidental to the accomplishment of the foregoing purposes, to advise and recommend the enactment of legislation on a national basis in the interest of the public and the independent consulting engineer, to oppose all legislation that is discriminatory or inimical thereto, and to assist the members comprising the Council in state or local matters that may have a bearing on the general interests of the Council.

constitution and by-laws and their adoption in revised form. The draft of the constitution and by-laws had been prepared by an Interim Steering Committee headed by John K. M. Pryke. Other members of the committee were Pecos Calahan, California; Tom Roche, Minnesota; and Bernard Dornblatt, Louisiana.

In essence, the constitution and by-laws provide for a federation of associations of independent consulting engineers. These documents are so written as to permit the Council to work toward its objectives without interfering with local autonomy.

Permanent Offices

The Council intends to set up permanent offices and employ an executive secretary to carry out its directives. Temporarily, the Council will operate through the offices of the New York Association of Consulting Engineers, at 220 E. 42nd St., New York. It is hoped that within three months the Council can have its own permanent offices and employ a staff.

Financing of the Council will be through dues levied on the member associations. The plans are to adopt a budget and then assess each member association on the basis of the number of members each association has in its local organization. This involves difficulties in that some of the associations have individuals as members while others have firm

AT THE DINNER MEETING FOLLOWING HIS ELECTION AS PRESIDENT OF THE CONSULTING ENGINEERS COUNCIL, JOHN K. M. PRYKE, NEW YORK CITY, WAS INDUCTED INTO THE INDIAN TRIBES OF OKLAHOMA. THESE RED SKINS ARE PROMINENT OKLAHOMA BUSINESS MEN AND SHRINERS WHO PRESENT THEIR DANCES FOR CHARITY.

memberships. A committee has been appointed to determine some equitable method of levying dues and determining voting power.

Following the adoption of the constitution and by-laws, the president appointed standing committees. These committees reported upon their objectives in a later session.

Hueston Smith, chairman of the Membership Committee, reported that his group will establish zones of operation for Membership Committee members and that it will be the objective of this committee to encourage organization of state associations qualified for membership in the Council.

The Publicity Committee, with C. C. Pate of Oklahoma as chairman, reported that the constitution and by-laws will be printed and mailed to all members as well as other interested consulting engineers. The committee also plans to send regular news releases to newspapers, news magazines, and technical publications telling of the activities of the Council and its members. Mr. Pate's committee will prepare a general technical handbook with a Code of Ethics and a publication telling clients how to hire a consulting engineer. The Publicity Committee also plans to send out a monthly news sheet to members and design a suitable emblem.

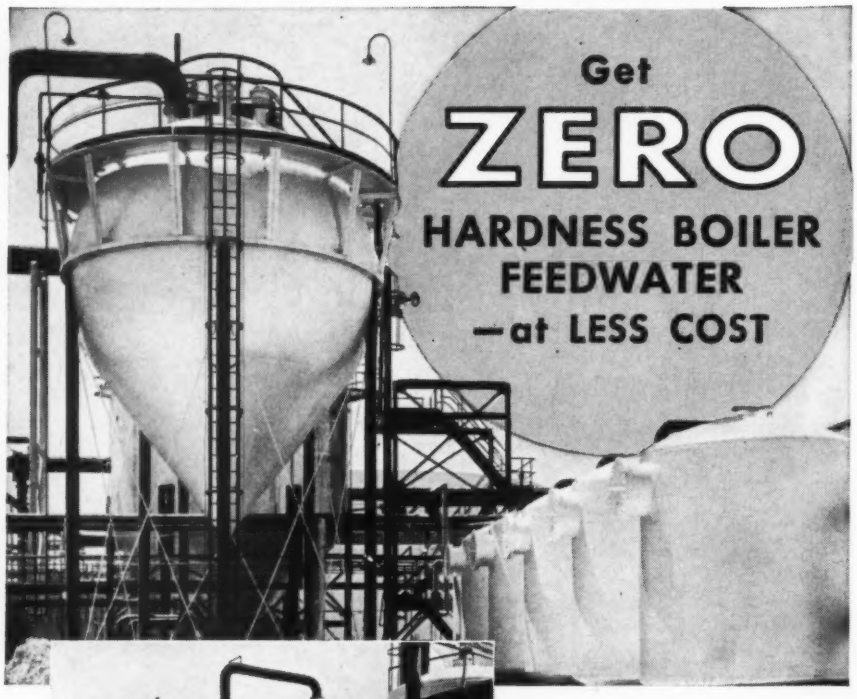
The Fees and Contract Committee, under George Heft, of Louisiana, intends to undertake a program to educate the Defense Dept.; the Bureau of Public Roads, and other Federal agencies in proper fee levels for engineers. No effort will be made to deal with local fees. This committee plans to work with AIA on standard fees for engineers.

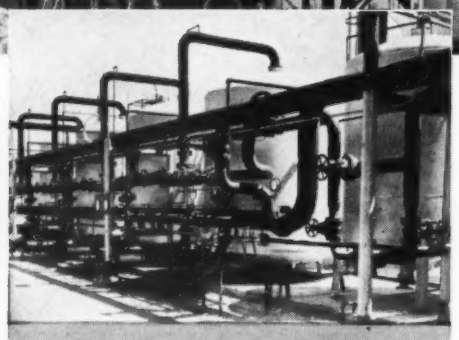
Bernard Dornblatt, chairman of the Professional Conduct Committee, stated that his group is going to give all possible aid to local groups concerning legal matters, legislation, and other such aspects of consulting work. He plans to get out a regular news letter, and he is going to arrange for Consulting Engineers Council representation on joint committees with architects, contractors, and other engineers associations.

An Ethical Practice Committee, under George Poulsen, Utah, will begin work immediately on a Code of Ethics.

These delegates from the ten founder associations accomplished a great deal in the two-day convention. There now seems to be only the hurdle of selling the individual members of the various associations on the value of the Council so that each association will agree to payment of the assessed dues. If the member associations indicate their support of the Council by paying their initiation fees and dues promptly, the Council will have solved its major current problem.

The constitution provides that the Board of Directors will meet quarterly, and the next meeting should see this financial question answered. ▲▲





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Men in Engineering

The firm of Campbell & Leppard, Engineers, announces that J. Leon Gabrels has become a partner in the firm. The firm is opening new offices at 3 West Plaza, Greenville, S. C.

The Consulting Engineers Association of Oregon, formed in Portland, Ore., in June, has elected J. Donald Kroeker as president. Chet A. Kershaw is vice president, R. Evan Kennedy is secretary, and Grant R. Kelley is treasurer. Metropolitan directors for 1956-57 are H. Loren Thompson and Thomas Roche Miles. Directors from the state at large for the first year are Lloyd K. Clark, Consulting Engineer, of Salem, Ore., and Holly A. Cornell, Consulting Engineer, of Corvallis, Ore.

McMAHON

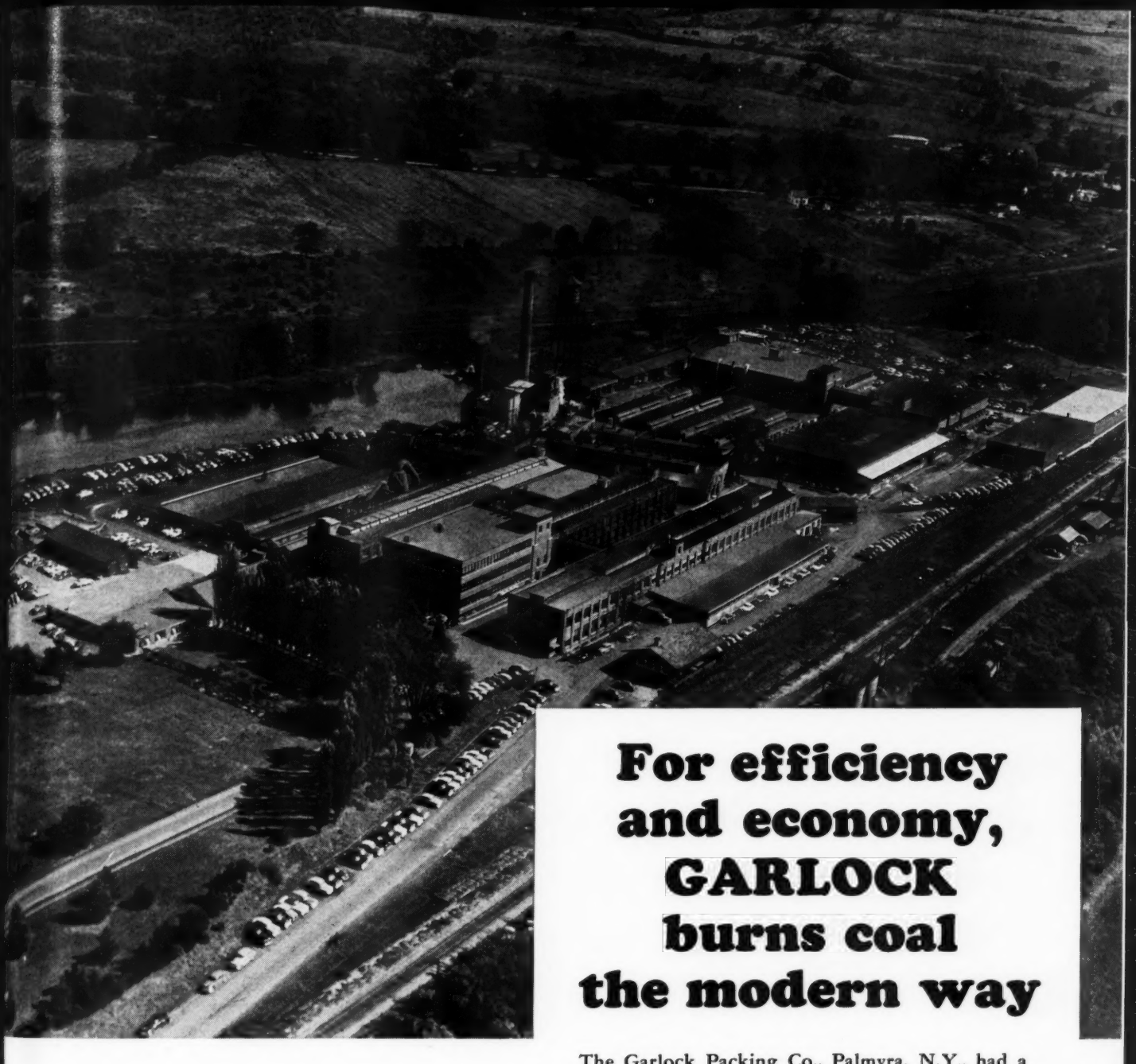
SCANLAN

Scanlan-McMahon Associates, Inc., a new firm of consulting engineers, has opened offices at 18725 Scottsdale Blvd., Shaker Heights, Ohio. Principals of the firm are Thomas R. Scanlan and James F. McMahon, Jr. The firm will specialize in design, installation, and operation of industrial process and steam power plant equipment.

Malcolm S. Spelman, formerly associated with Howard, Needles, Tammen & Bergendoff on the planning and construction of turnpikes, has joined the consulting firm of Gussow & Skidmore, to form the new firm of Spelman, Gussow & Skidmore, consulting engineers, New York City.

Robert J. Prowse, formerly assistant bridge engineer of the New Hampshire Department of Public Works and Highways, has joined the staff of D. B. Steinman, Consulting Engineer.

The new architectural-engineering firm of Connell, Pierce, Garland and Friedman, will specialize in design and supervision of commercial, industrial, and institutional projects. Partners are Maurice H. Connell, Harvey F. Pierce, and Edmund



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1. Aluminum rigid conduit resists corrosion. It resists all kinds of attack, even in contaminated areas. Rarely needs painting, yet it outlasts all others . . . saves for the life of the installation.

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Friedman, all Fellows of the Florida Engineering Society, and James E. Garland, AIA, Dade County (Miami) school architect, and former Florida state school architect. The engineers are members of the Miami engineering and design firm, Maurice H. Connell and Associates, Inc., which will continue its present operations. Offices will be in an addition to Connell and Associates building at 315 N.W. 27 Ave., Miami.

Ebasco Services, Inc. has announced appointment of James E. Kearney as manager and John J. Lynch as assistant manager of the Industrial Engineering Div.

Col. Paul H. Griffith has been elected executive vice president of Buchart, Inc., of York, Pa. and Washington, D. C.

Weinberger, Weishoff, Leichtman & Quinn, Consulting Engineers, and Sidney Frieman, Consulting Engineer, have announced formation of the firm of Weinberger, Frieman, Leichtman & Quinn. Offices will be at 20 Vesey St., New York, N. Y.

At Ebasco Services, Inc., Charles C. Bonin has been appointed engineering manager, H. K. Fairbanks has been named chief concrete-hydraulic engineer, and G. F. Latham is named chief architectural-structural engineer.

Dana A. Griffin, former president of Communication Measurements Laboratory, Inc., has joined the firm of John Diebold & Associates, Inc., as senior consultant in factory automation systems.

HANSON

CAMPBELL

Nielsen and Bruch, Consulting Engineers, Minneapolis, Minn., have announced appointment of Donald C. Campbell and H. Jack Hanson as associates of the firm.

Paul Weir, chairman of the board, Paul Weir Co., Chicago has been elected to Honorary Membership in the Institution of Mining Engineers, a federation of the eight Institutes of Mining Engineers in Great Britain.

Albert Easton White, consulting metallurgical engineer, has been elected to Honorary Membership in

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The best way to look into Trambeam is to see how others are using it. Illustrated are five current case studies—all giving complete data on Trambeam operation in leading firms. Write today for these folders—you'll find them profitable reading.

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2. Booklet shows Trambeam coverage of storage, shipping and receiving areas for Chase Brass and Copper Co. Bulletin M-31.

3. Here's one man push-button control for loads to 10 tons. See how Verson All-Steel Press Co. does it. Bulletin M-28.

4. Discover how Trambeam speeds production at Westinghouse jet engine plant. That's the story told in Bulletin M-29.

5. Trambeam speeds charging and pouring in the foundry of Allis-Chalmers Manufacturing Co. Write for Bulletin M-27.

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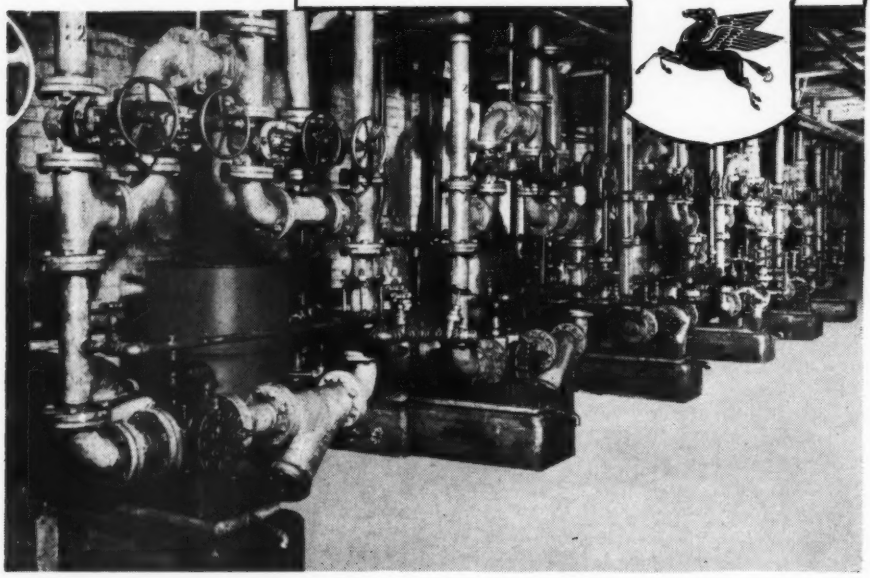

24 Sier-Bath "Gearex" Pumps, internal gear and bearing type, are used in lube oil blending service at Socony Mobil's Greenpoint, Brooklyn Refinery. Each size C-3 "Gearex" Pump delivers 150 gpm. at 95 psi., with a viscosity of 2000 SSU and is driven by a 15 hp., 1750 rpm. motor. Pumps have built-in relief valves.

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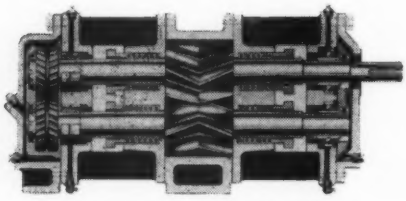
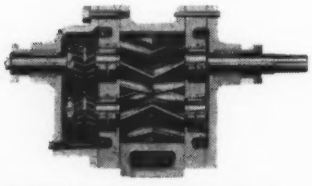


EXTERNAL GEAR & BEARING TYPE
for non-lubricating liquids



INTERNAL GEAR & BEARING TYPE
for lubricating liquids

Sier-Bath "Gearex" Pumps provide positive displacement, pulseless flow . . . quiet, vibrationless operation. Direct-connected up to 1800 RPM, they require no reduction gears. For sustained high volumetric efficiency and long life there is no rotor-to-rotor or rotor-to-casing contact. Low pressure on stuffing boxes provides easy servicing.

Horizontal or vertical models to handle 32 to 500,000 SSU, 1 to 550 GPM at 250 PSI for viscous liquids, 50 PSI for water. Corrosion-resistant alloys, steam-jacketed bodies, water-cooled bearings, other adaptations to meet individual needs. Call your local Sier-Bath Pump Representative . . . send for Bulletin G-2. *Sier-Bath Gear & Pump Co., Inc., 9257 Hudson Blvd., North Bergen, N. J.*

Sier-Bath ROTARY PUMPS

Screw Pumps — Gearex® Pumps — Hydrex® Pumps

50th Anniversary — Mfrs. of Precision Gears, Rotary Pumps, Flexible Gear Couplings — Member A.G.M.A.

the American Society for Testing Materials, for especially meritorious service to ASTM.

Gellert, Griffin, Harrigan & Associates, Seattle, Wash., has announced its affiliation with the Harrisburg, Pa. firm of Gannett, Fleming, Corddry & Carpenter, Inc.

Fred S. Dubin Associates announce the opening of a new office at 262 Fifth Avenue, New York City. Aaron Zickerman, mechanical engineer, will be in charge. The Dubin firm has also added the following engineers to its staff: Ian Grad, Selwyn Bloom, Milton Lawrence, Sidney Greenlief, Paul Conde, Thomas Woodward, Thomas Killian, J. Hockhauser and, B. O'Connor.

William F. Ryan, vice president, director, and senior consulting engineer of Stone & Webster Engineering Corp., has been nominated to serve as the 1956-57 president of the American Society of Mechanical Engineers. Nominee for vice president of Region II is William H. Byrne, president and chairman of the board, Byrne Associates, Inc., New York.

Two consultants have been named Fellows of the American Institute of Electrical Engineers: George J. Fielder, principal engineer, Sverdrup and Parcel, Inc., St. Louis, Mo., "for his contributions to the analysis, synthesis, and design of automatic process control systems;" and S. L. Scheffer, project director; Burns and Roe, Inc., New York City, "for his contributions to control of transportation of bulk material . . ."

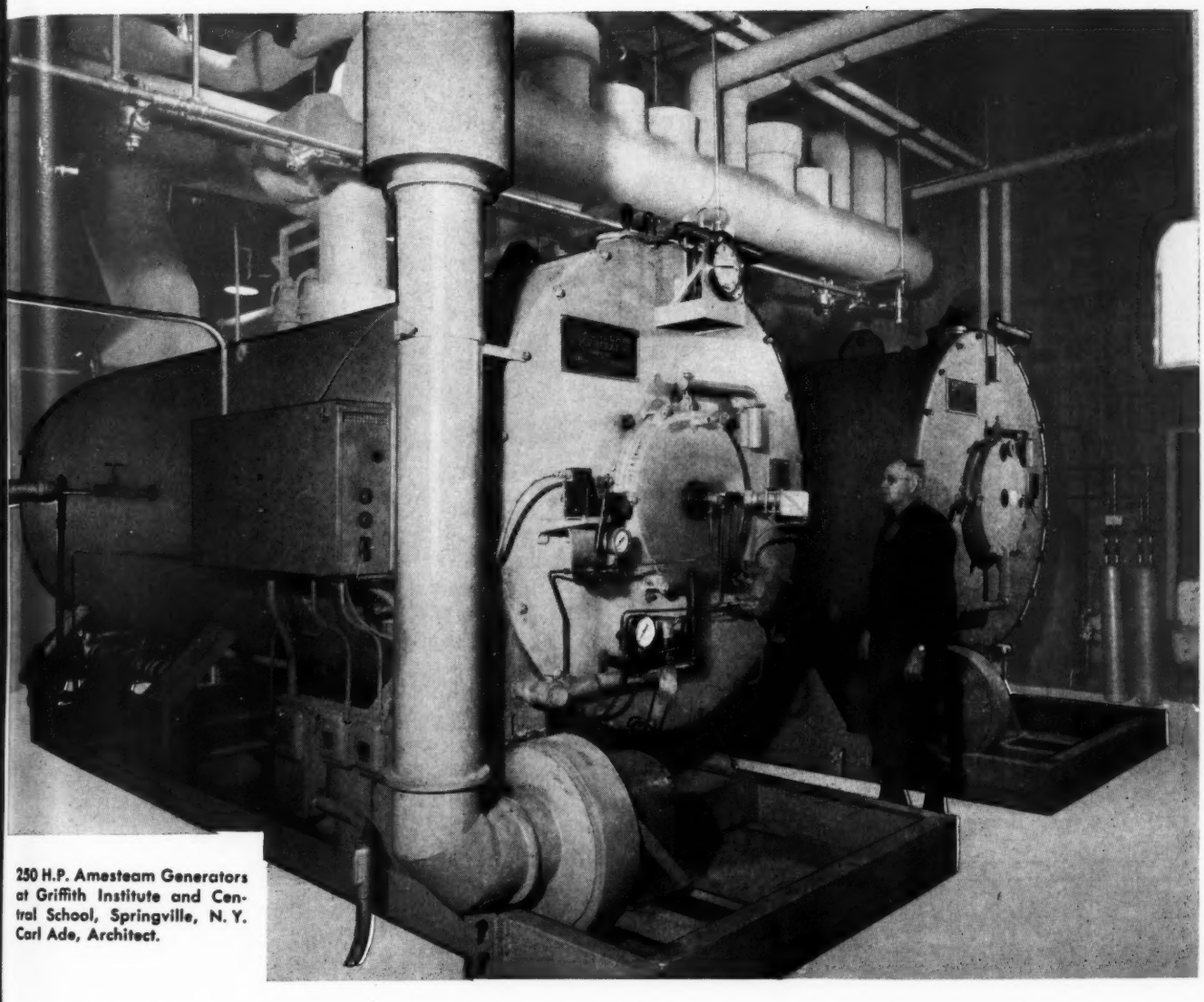
Russell S. Bodwell, formerly associated with Porter, Urquhart, McCreary & O'Brien, of Newark, N. J., has been appointed assistant chief engineer of the Union Building & Construction Corp., Passaic, N. J.

Alan T. Knight, executive vice president of Catalytic Construction Co., has received the Drexel Key Award, presented annually by the Alumni Association of the Evening College of Drexel Institute of Technology to an outstanding alumnus.

Sanderson and Porter, engineers and constructors, New York City, and United Engineers & Constructors, Inc., Philadelphia, have been elected to membership in the National Constructors Association.

Expert Witness Reprint

Robin Beach's five articles on "The Engineer as an Expert Witness" are available in a 16-page reprint for $1.00. Please write to: Reader Service Dept., CONSULTING ENGINEER, 227 Wayne St., St. Joseph, Mich.



250 H.P. Amesteam Generators at Griffith Institute and Central School, Springville, N. Y. Carl Ade, Architect.

ANOTHER FINE SCHOOL REPORTS SATISFACTION WITH

AMESTEAM GENERATOR

The beautiful new Junior-Senior High School above represents the finest functional educational design in the distinguished 126-year history of Griffith Institute at Springville, N.Y. Thoroughly in keeping with the modern facilities are the two 250 h.p. Amesteam Generators. These fully automatic "package" boilers, installed as complete units without complicated on-the-job assembly work, require a minimum of space.

Writes Principal Charles Knapp:

"Now that the two Amesteam Generators have been in operation in supplying heat for the new Junior-Senior High School building at Griffith Institute and Central School, I should like to tell you how pleased we are with them.

We find them much cleaner, of course, and we are also well pleased with their very dependable and economical performance. As you know, we still have coal-fired boilers in the older buildings, so we have a chance to make a direct comparison. I can assure you that whenever these coal-fired units need replacing, our first consideration will be Amesteam Generators."

Letters like this tell us of the satisfaction with Amesteam Generators in institutions, plants and public buildings throughout the country. In fact, an Amesteam Generator on the job is our best salesman! If *you* want the economical, dependable operation possible only with a quality boiler, mail the coupon below.

AMES IRON WORKS INC.
OSWEGO, N. Y.
BOX P-86

AMES IRON WORKS, INC.
BOX P-86, OSWEGO, N. Y.

Please send me engineering details on AMESTEAM GENERATORS and name of nearest AMES representative.

NAME.....

COMPANY.....

ADDRESS.....

News for the Consultant

Use of Mass Transportation Necessary for City Growth

Need for greater use of the facilities of the Columbus Transit Co., if the city of Columbus, Ohio, is to continue to grow, was emphasized by John Curtin in commenting on the progress of a study his Philadelphia firm of Simpson & Curtin is making for the company.

Several of the recommendations his firm is expected to make to the CTC at the end of the survey were outlined by Curtin at a meeting of civic leaders and city officials.

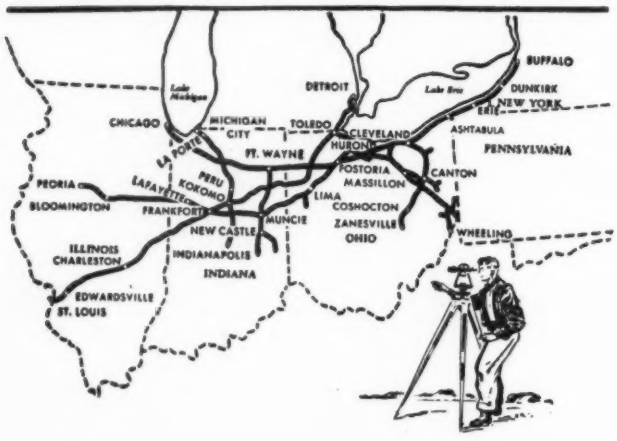
Among the suggestions discussed were express service, transit lanes, and other improvements in the movement of traffic.

The survey, which began last April, was divided into three phases: a count of passengers using the various transit lines; a speed and delay study which shows traffic obstructions; and a survey by Ohio State University students showing the number of bus passengers at different times of day.

The survey will attempt to determine the adequacy of service in Columbus today as well as the dependability of the equipment. Also to be studied by the company will be promotional services that would be feasible for CTC to adopt.

These may include express buses, shoppers' specials, park-and-ride plans, and club buses.

Preliminary checks by the consulting firm show that about 60 percent of those who come into the



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Let "Nick Plate" send you our detailed and accurate "Along the Line" surveys covering natural and agricultural resources, utilities, labor and other pertinent data relating to each specific location. Just tell us the area or type of location you are interested in. Call or write:

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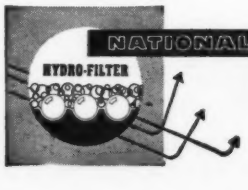
YOU'RE READY FOR NATIONAL HYDRO-FILTER

In the National Hydro-Filter, contaminated air never comes in contact with a dry surface. There are no baffles to clean, no "blind" areas to clog and reduce efficiency. Water flows countercurrently to air to produce *full time* self cleaning action. Automatic sludge removal completes the picture.

If you operate, or need, a wet type dust collector — you're *ready* for maintenance free, constant flow efficiency — to the micron range. You're ready for the National Hydro-Filter.

Write for bulletin 55 today!



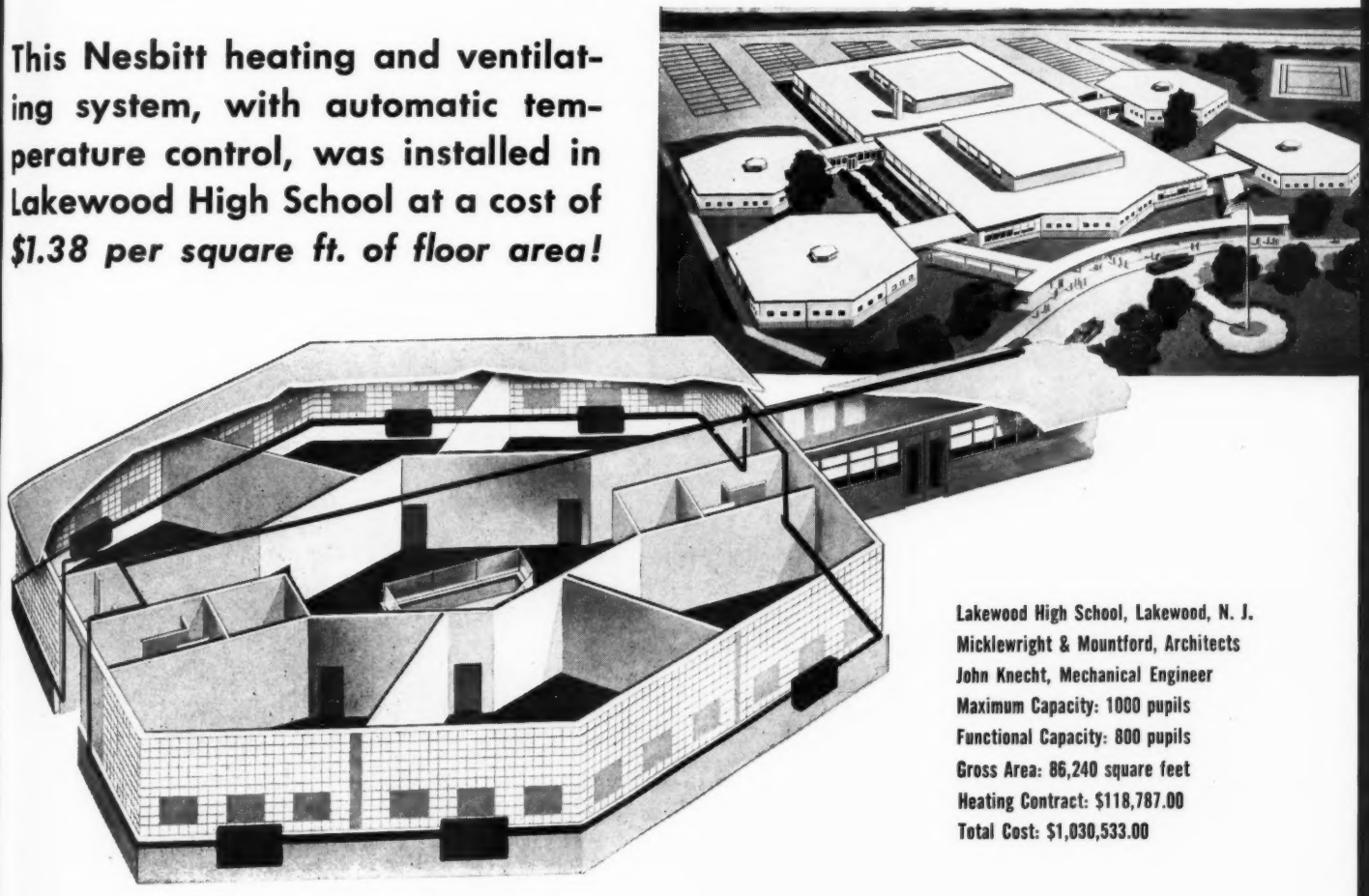
Dust Collector Corp.
606 Machinery Hall Bldg.
Chicago 6, Illinois

PROOF...

More Learning per School Dollar

through use of the Nesbitt Series Hot Water Wind·o·line System

This Nesbitt heating and ventilating system, with automatic temperature control, was installed in Lakewood High School at a cost of *$1.38 per square ft. of floor area!*



Lakewood High School, Lakewood, N. J.
Micklewright & Mountford, Architects
John Knecht, Mechanical Engineer
Maximum Capacity: 1000 pupils
Functional Capacity: 800 pupils
Gross Area: 86,240 square feet
Heating Contract: $118,787.00
Total Cost: $1,030,533.00

THE specification of the Nesbitt Series Wind-o-line System for Forced Hot Water Heating at Lakewood High School saved 2,400 feet of pipe trenches and 2,900 feet of additional mains and pipe covering when measured against a conventional steam system.

The Nesbitt Series Wind-o-line System effects these savings through the use of a unit ventilator radiator that delivers the required amounts of heat by multi-passing only one-third the usual amount of water—but at higher temperatures than is circulated by conventional hot water systems. This reduces the pipe size requirement to where the copper tubing of Wind-o-line Radiation can serve as the only supply and return piping for all the unit ventilators in an entire classroom wing, thus eliminating the need for mains, costly pipe trenches, coverings, and individual runouts to each unit.

Moreover, smaller water quantities mean smaller, less expensive pumps—with lower operating costs. And because the gravity heating effect of Wind-o-line Radiation and the Syncretizer radiator is sufficient to maintain overnight classroom temperatures, the cost of additional controls and equipment for that purpose is eliminated.

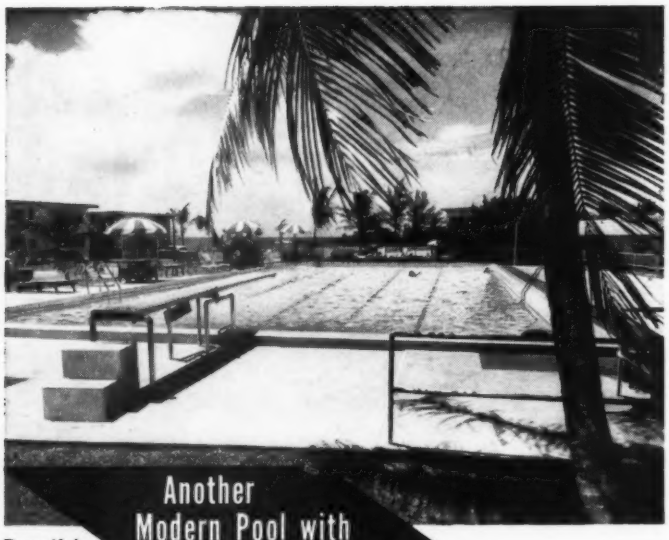
The Nesbitt Series Wind-o-line System means *greater comfort,* too! Since the system water temperature is varied by outdoor temperature, Wind-o-line's protection against cold surfaces and window downdrafts is continuously related to actual needs — helping to create the thermal environment most conducive to learning.

Nesbitt Heating and Ventilating offers you
MORE LEARNING PER SCHOOL DOLLAR
Write for further information

Nesbitt

SERIES WIND·O·LINE SYSTEM

Manufactured and sold by John J. Nesbitt, Inc., Philadelphia 36, Pa. **Sold also by American Blower Corporation and Canadian Sirocco Co., Ltd.**



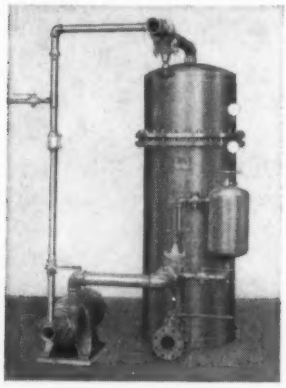
Beautiful Silver Thatch Inn, on Pompano Beach, Florida, offers its guests this lovely pool with underwater picture windows.

YES, here's another distinctive pool with the popular Adams Poro-Stone filters. More and more public pools are insisting on Adams Filters, and there are many good reasons why. Here are two of the important ones.

First, the exclusive ADAMS HI-FLOW backwash design gives you simple and easy cleaning . . . no messy disassembly . . . no scrubbing of filter elements. The high air dome and unrestricted backwash outlet provide complete purging of the filter tubes with high velocity water.

Second, rugged 4¼" O.D. PORO-STONE elements with nearly 40% open area are unaffected by corrosion. The first Adams swimming pool filter — in use since 1938 — was the first Poro-Stone Swimming Pool Filter installed in this country.

There are numerous other reasons why it pays to specify and buy Adams SPF filters. Get all the facts by writing for your copy of Bulletin 625. Use the Handy coupon below.



This Adams SPF-129 Poro-Stone Filter keeps the Silver Thatch Inn pool water brilliantly polished for the enjoyment of swimmers and viewers alike. It offers 129 square feet of filter area . . . will handle pools up to 185,000 gallons capacity. It is ideally suited for outdoor pools such as is shown above.

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Buffalo 17, N. Y.

R. P. ADAMS COMPANY, INC. Au-56
256 EAST PARK DRIVE, BUFFALO 17, N. Y.

Please send me by return mail your new Bulletin 625.

Name.....Title.....
Business.....
Street.....
City.....State.....
Size of pool is.....gallons.

downtown area use mass transportation. Curtin pointed out that this is far below what is desired, adding that New York City transports 98 percent of its downtown visitors by mass transportation.

For the benefit of Columbus' mass transportation riders Curtin said his company would ask for "a better break" on how the CTC is permitted to use its buses on city streets.

Another part of the study will be consideration of how far people must walk to a bus line. Generally speaking, bus lines must be within a quarter of a mile of riders before they will patronize them.

Highway Bridge Engineers Favor Welded Bridge Design

Of 39 state bridge departments responding to a survey conducted by The James F. Lincoln Arc Welding Foundation, of Cleveland, Ohio, 15 are increasing their use of welded highway bridge design. Another 13 states are using welding for certain details such as coverplates, diaphrams, and shoes. Many of these states also are considering adopting completely welded designs for more of their bridges.

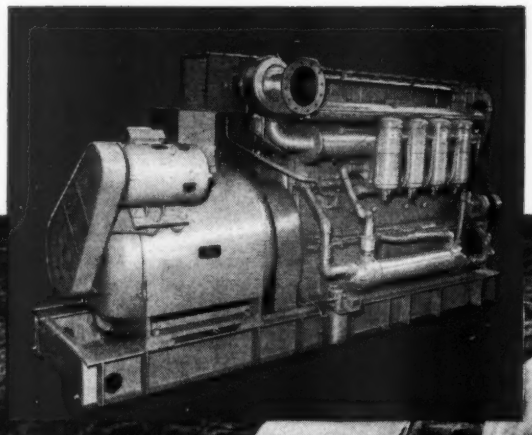
Reported savings in steel in typical bridges, resulting from welded design, ranged up to 20 percent. The Foundation points out that the projected

SERVICE ROAD OVER HOOVER DAM RESERVOIR, DESIGNED BY BURGESS & NIPPLE, COLUMBUS, OHIO, HAS SPANS OF WELDED HAUNCHED PLATE GIRDERS.

Federal highway program of $51 billion will require an estimated 23 million tons of steel. Approximately half of this will go into bridges and overpasses. If welded bridge design were able to save 20 percent of this requirement, the nation would save, on bridges alone, more than three times as much steel as was used for all highway purposes in 1954. Savings in cost realized on welded bridges were reported to amount to 15 to 20 percent.

Wider Use of Geodetic Control Urged in Highway Surveys

Speaking before the national convention of the American Society of Civil Engineers, Captain Charles Pierce, chief of the Division of Geodesy of the U. S. Coast and Geodetic Survey, urged the use of geodetic control to improve accuracy of highway



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White's Superior Diesels...

United Press Photo

TEXAS TOWERS' WARNING WILL ALERT OUR NATION

This U. S. Air Force early warning radar station off the coast of Cape Cod is called the Texas Tower. Aboard the Tower, radar eyes search the skies. In the event of approaching enemy bombers, a push of one red button will warn our coastal areas and start our air defense into action!

Two more Towers are now being built for the U. S. Air Force by the U. S. Navy, to be a vital part of our nation's far-reaching radar air defense system. They require high-quality, heavy-duty equipment giving dependable performance with minimum maintenance over long periods of continuous service. White's Superior Diesel engines meet these requirements . . . they have been selected to generate the power for the vital radar operations, and also for the radio, communication, heating, lighting and ventilating equipment aboard the additional Towers.

If you require rugged, heavy-duty, high-quality Diesel engines for the most dependable and economical operation, choose White's Superior Diesels. There's a size and type for virtually every requirement from 215 to 2150 horsepower, or 150 to 1500 KW. Get complete information now.

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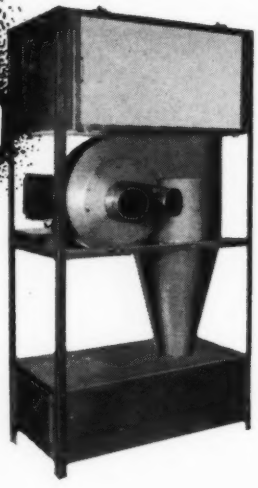
WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY *Plant and General Offices: Springfield, Ohio*

EFFICIENT–LOW COST

Dust Collection



Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dustkop *FIRST* among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units; or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.

DUSTKOP® STOPS DUST

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take it up a Flo-Tube,

the spiral conveyor of dependable service. Used on incline or horizontally.

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ACCESS PORTS

EXPOSED END IN BIN OR PILE

Mechanically handles materials from grain size to lump . . . sand, rice, seed, pellets, flakes, steel chips, wood waste, coal, etc.

STEEL TUBE OR CAST IRON TROUGH

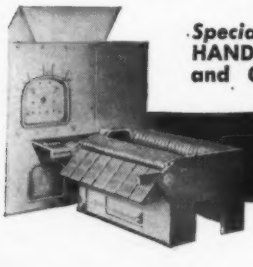
OR LIQUIDS ?

WAGENER PUMPS

SIMPLEX DUPLEX

STEAM or POWER models for any need

TYPICAL MATERIALS PUMPED:
ACIDS, ALCOHOLS, BEER & POTATO MASH, DYES, GLUE, OIL (any kind), ASPHALT, BRINE, MILK, MOLASSES, SOAP, SEWAGE, WATER, TAR, GROUT



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surveys. He noted that horizontal and vertical alignment of modern highways is much more of an engineering problem than it was for highways constructed 20 or 30 years ago.

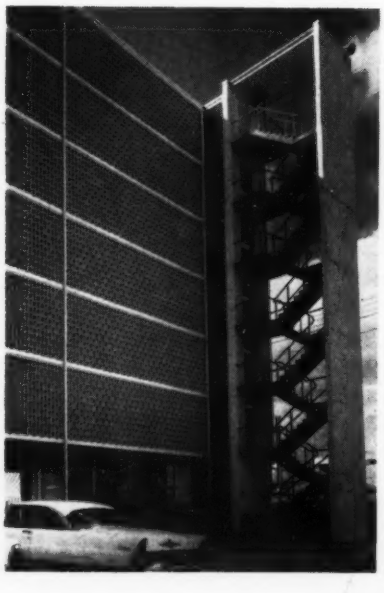
He estimated that there are thousands of miles of highway surveys run every year that are completely independent of one another. If these highways were connected to geodetic control, there would be no need to double back for a check, observe azimuths for orientation, or operate each project on an isolated basis. The value of all highway surveys could be perpetuated by placing monuments with pertinent information along the right-of-way, he suggested.

Several state highway departments already are using geodetic control as a basis for surveys. Massachusetts and Connecticut use this control extensively, and Nevada, California, Virginia, Florida, and others, use control when it is available.

Commenting on complaints that much of the basic geodetic control is placed on mountains and in inaccessible areas, he explained that this is necessary in primary work for complete coverage, but that after the primary work is completed, the best locations for the secondary work is along the highways. This would make the control accessible for future highway construction, and to local engineers and surveyors in placing work on the State coordinate system.

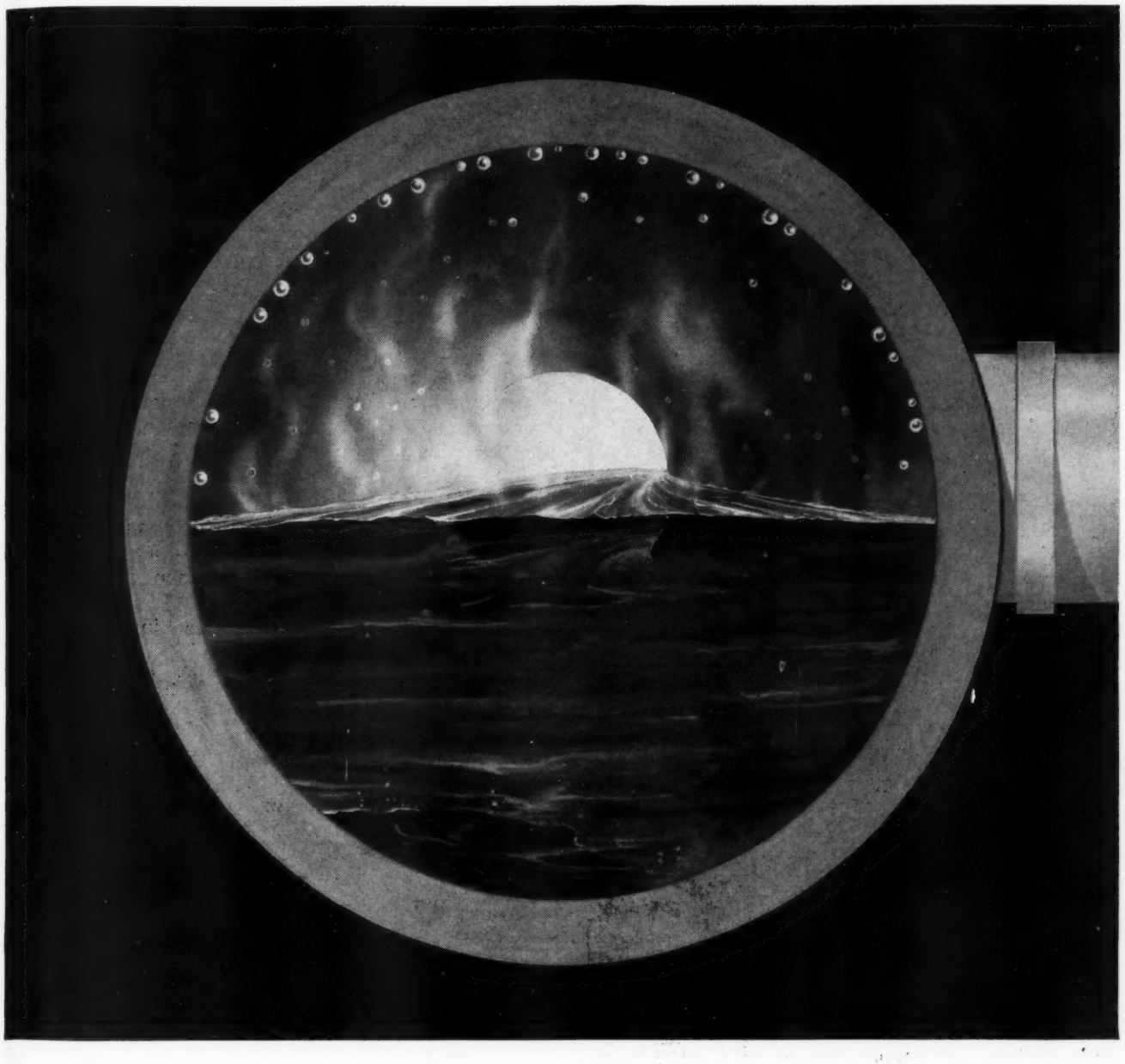
Engineering Foundation Grant for Reinforced Concrete Floors Study

Of the $53,000 appropriated by the Engineering Foundation for engineering research during the fiscal year 1956-57, $5000 has been allocated to the Reinforced Concrete Research Council for a special investigation of multiple-panel reinforced concrete floors for buildings. The study will be concentrated on the various types of floors made up of slabs con-



CLAY FLUE WALL

The honeycomb design of this wall of the Pan American Motel, New Orleans, La., is created by use of clay flues, ordinarily used to line chimneys. Flues were laid in a steel angle at the top and bottom of each floor in mortar about ½ in. thick. The wall has the same structural strength as an eight-inch brick wall. Curtis & Davis, Architects and Engineers, of New Orleans, designed the building.



WHAT'S A MONOMOLECULAR FILM?

It is a film one molecule thick. Filmeen* in steam or condensate lines produces a monomolecular film.

But, there's a lot more to it than thickness. The film's most important function is protection against corrosion. By forming a nonwettable coating on all metal surfaces with which treated steam or condensate come in contact, Filmeen provides a protective, corrosion-inhibiting barrier between water and metal. In heat exchange equipment, the condensed steam treated with Filmeen then forms as spherical drops of water which resist adherence to the film surface, much the same as a drop of water will form into a small ball on a waxed surface. This phenomenon results in increased rate of heat transfer—which in turn saves money in power plant operation.

When steam condenses on untreated return lines, it forms a continuous layer of water that restricts heat transfer. You don't want that... it raises the cost of heat.

Your Dearborn sales engineer will gladly explain how Filmeen can keep your heating costs in line.

**Filmeen is the trade-mark of a corrosion-inhibiting compound produced exclusively by Dearborn Chemical Co. U.S. Pat. No. RE 23614.*

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Please send me complete information about Filmeen.

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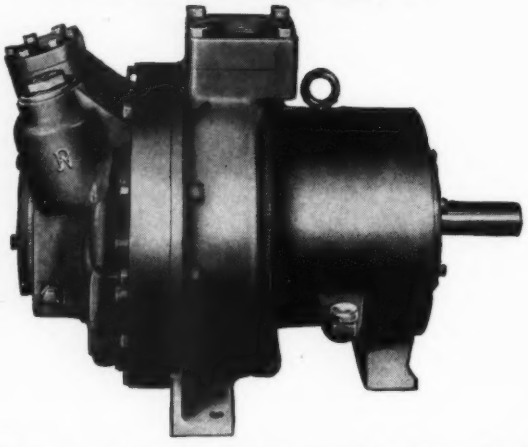

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Write for Bulletins No. 4110-A to 4110-F inc., describing this outstanding line of small and medium capacity turbines ranging from ¼ to 120 horsepower. Also Bulletin on turbo-generators rates 500 to 15,000 watts, D.C.

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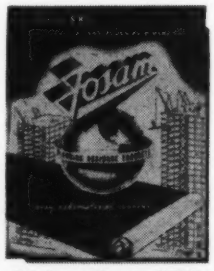
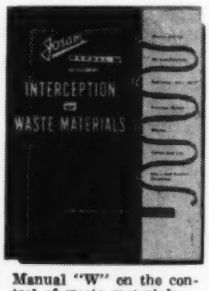
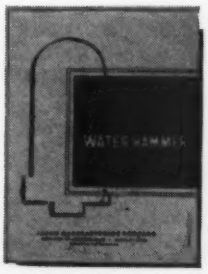


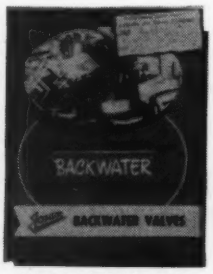
208 Page Manual "SK" of Specifications and Roughing-in Details



Manual "W" on the control of waste materials



Manual "SA" describing Shock Absorbers for supply lines



Manual "BW" on the hazards and control of back-water

Manual "SP-5" on Swimming Pool circulation and drainage

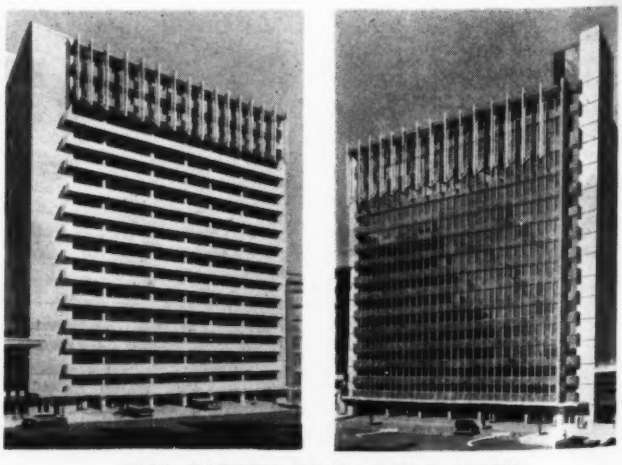
tinuous in two directions, either supported on beams spanning between columns or supported only at the columns. Present building codes call for basically different designs for floors with and without beams. The test program will study the two basic types of structures and their variations, with the aim of determining if their behavior is sufficiently different to justify existing differences in the bases of design.

Engineering Firm Studies Financing of Sewer Program

A proposal for a $19 million program of sewer extensions and improvements, to be financed through a revenue certificate issue tied to service charges based on water consumption, will be submitted this fall to the voters of Jacksonville, Fla.

In preparation for such action, the Jacksonville City Commission has authorized the Boston engineering firm of Metcalf and Eddy to make a detailed study and analysis of the water used for the last two years by the 60,000 connections in service in the city.

Preliminary reports of the engineers included proposals to levy a charge based on the number of sanitary facilities in a structure, the number of rooms, or a surcharge on water bills, as well as the water consumption charge. Under the water consumption basis, a charge would be made for the water that goes through the plumbing facilities of a building, but not for water used for irrigation, such as lawn sprinkling.



CARS PARKED NEAR OFFICE DOOR

The 15-story Petroleum Club Building in Oklahoma City, Okla., provides 540 parking spaces on 13 floors, adjacent to office quarters. View of rear of building (left) shows open, concrete balcony construction of parking area. Front (right) has continuous strip windows alternating with continuous blue aluminum panels covered with natural aluminum diamond mesh. The top two floors are designed for use of the Petroleum Club. Bowser Parking System makes use of electrically controlled car lifts, which move both vertically and horizontally.

In Taconite processing plant, ANACONDA Interlocked-armor cable is used for feeder line . . . resists weather and industrial hazards.

New cable puts power where you want it—fast!

With ANACONDA Interlocked-armor cable you bring power to new load centers faster—change plant layout quickly, or add new facilities in a hurry!

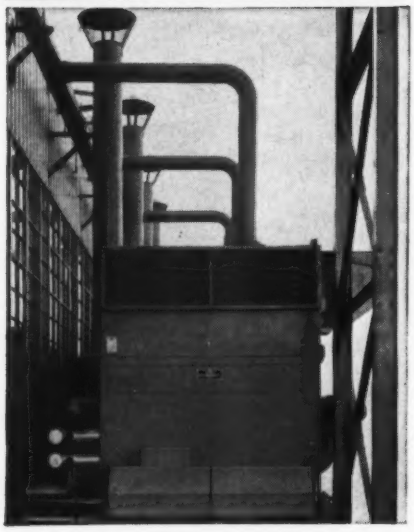
It is economical—installed fast—indoors or out—with simple supporting devices . . . trained easily around corners, columns and other obstructions in long unbroken runs. Circuits are easy to relocate . . . always accessible. And this cable's interlocked metal-tape armor affords high mechanical protection against all types of damage.

The Man from Anaconda, or your nearest Anaconda distributor, will be happy to give you full information. Or write to: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 56308

ASK THE MAN FROM ANACONDA®
FOR INTERLOCKED-ARMOR CABLE

Anaconda Interlocked-armor cable comes in sizes No. 6 Awg to 750 Mcm—copper or aluminum—up to 15 kv—Underwriters' approval for 600 volts and 5000 volts. Available with rubber-, plastic- or varnished-cambric-type insulation.

HOW YOU SAVE...



...getting drier Compressed Air

● Save the cost of cooling water and you save the price of the Niagara Aero After Cooler (for compressed air or gas) in less than two years.

Extra, for no cost, you get drier compressed gas or air for your process. You get better operation and lower costs in the use of all air-operated instruments, machines, or paint sprays. You save expense for piping, pumping, water treatment and disposal. You get the use of badly needed water elsewhere in your plant.

Niagara Aero After Cooler cools compressed air or gas (evaporatively) below the temperature of surrounding atmosphere, with no further condensation in your air lines.

Write for complete information; ask for Bulletin No. 98, or contact nearest Niagara Engineer if you have any problem involving the industrial use of air. Address Dept. C.E.

NIAGARA BLOWER COMPANY
405 Lexington Ave., New York 17, N.Y.
District Engineers
in Principal Cities of U. S. and Canada

New Projects Reported

By Consulting Engineers—

ALABAMA

Lockwood Greene Engineers, Inc. Plant for refining rare metals—steel frame, masonry walls, steel deck roof. Daniel Construction Co., Birmingham, Ala., General Contractors. $500,000. Client, P. R. Mallory & Co., Inc., Indianapolis, Indiana.

CALIFORNIA

Fluor Corp., Ltd. Design, erection, and start-up supervision of the second of four 60,000 kw units at the San Bernardino, Calif. steam generating plant. Client, California Electric Power Co.

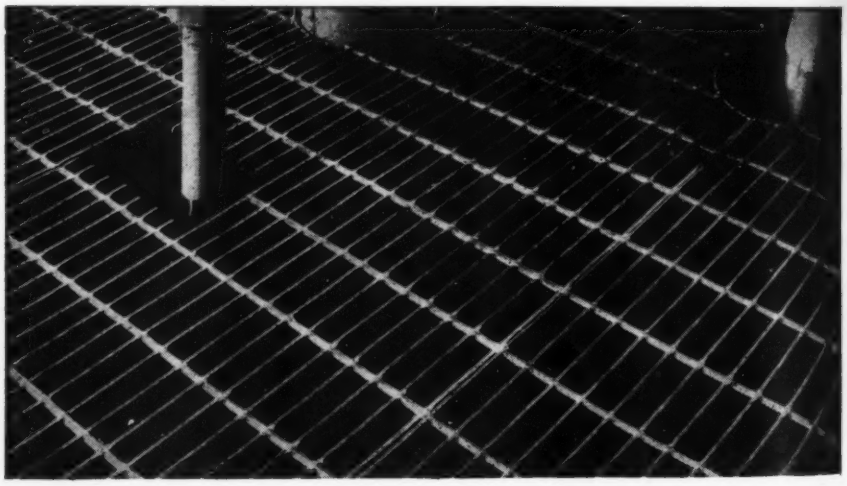
W. B. Semco & Associates. Plant layout and materials handling systems and equipment design. Foundry for brass, aluminum, and cast iron on a continuous pour basis. Total about 108,000 sq ft. $2,000,000. Client, Ensign Carburetor Co., Fullerton, Calif.

Plywood plant to produce 5,500,000 sq ft per month. Plant layout and production systems. $1,250,000. Client, Albrite Mfg. Co., Oakland, Calif.

J. S. Hamel, Engineer. Electrical and mechanical design for Autonetics Building. Approximately 300,000 sq ft, two-story, tilt-up concrete and lift slab construction, 600 tons air conditioning. Will be used for research and development and manufacture of radar components and Senco mechanisms. Structural engineer, Richard R. Bradshaw. $2,700,000. Client, North American Aviation, Inc., Downey, Calif.

John S. Bates and Roy M. Trotter. Enlargement of sewage treatment plant for population of 35,000. New digester and control building. $70,000. Client, City of Concord, Calif.

Enlargement of sewage treatment plant for population of 18,000. Increase of pumping capacity, primary and secondary clarifiers, high rate filter, chlorine contact, digester, sludge heater, and sludge drying beds. $375,000. Client, Mill Valley, Calif.



Gary

WELDED GRATING

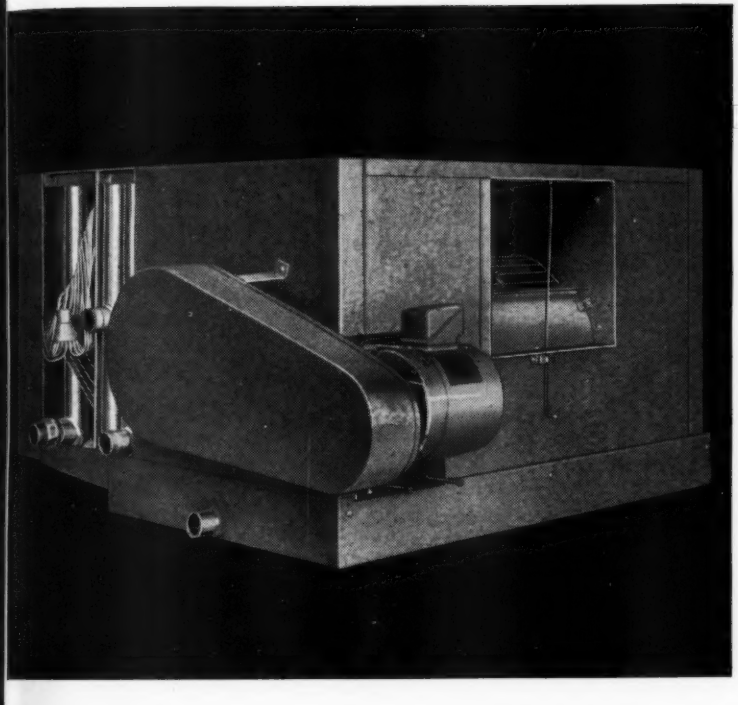
Tailor Made to Your Specs

Save installation time and money by having Gary factory-fabricate your open steel flooring needs. For complete description of Gary Gratings, write for Catalog No. CE-86.

FREE SAMPLE
We'll send this handy paper weight if you request it on your company stationery.

Standard Steel Spring Division
ROCKWELL SPRING AND AXLE CO.
4015 East Seventh Avenue • Gary, Indiana

AMERICAN BLOWER OFFERS FLEXIBILITY AND HIGH EFFICIENCY IN EQUIPMENT TO AIR CONDITION ANY SPACE

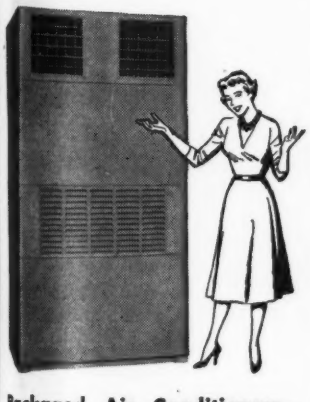


American Blower central-station cabinet-type air conditioning units cool and dehumidify in summer using chilled water, direct-expanded refrigerants, or brines; and heat and humidify in winter with steam or hot water. Quiet slow-speed fans, aileron air-volume adjustment, and air-mixing dampers combine high efficiency with accurate control to assure perfect year-round temperatures at low operating cost.

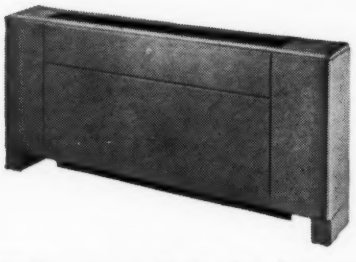
Built in sections of heavy-gauge zinc-coated steel, these units resist corrosion, make handling and erection easier. Filter boxes, piping, air discharges, and standard motors can be positioned *during installation* to meet requirements exactly. They occupy a minimum of space relative to output (capacities: 600 cfm to 48,000 cfm), and are available in horizontal or vertical arrangements, for floor or ceiling mounting.

For full details on American Blower air conditioning equipment—contact our nearest branch office, or write us direct.

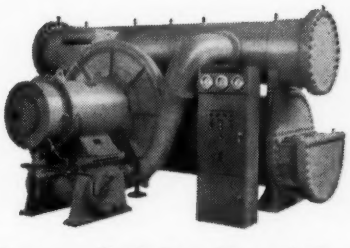
Whatever type air conditioning system you plan, we have equipment to meet your exact requirements



Packaged Air Conditioners—Durably finished, quiet operating, 3- thru 20-ton capacities.



Diaflo Room Units, for floor or ceiling mounting, offer exclusive fan design, throwaway or cleanable-type filters. Enclosures lift off by hand.



Tonrac —Single-Stage Hermetic Centrifugal Refrigerating Machines have few moving parts, install on single level. Completely self-contained.

American Blower products serve industry

- Air Conditioning, Heating, Ventilating Equipment
- Mechanical Draft Equipment
- Industrial Fans and Blowers
- Centrifugal Compressors
- Gyrol Fluid Drives
- Dust Collectors
- Refrigerating Machines

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American-Standard

AMERICAN BLOWER

NEW *V-notch Chlorinators* **SIMPLIFY** *Chlorination*

With the new Wallace & Tiernan V-notch Variable-Orifice Chlorinators:

OPERATION IS SIMPLIFIED as one injector control starts or stops the unit. Chlorine gas is turned on or off automatically.

SETTING FEED RATE IS SIMPLIFIED as one control sets feed rate precisely at both high or low feeds.

INSTALLATION IS SIMPLIFIED as units are shipped ready for operation. No water supply is needed at the chlorinator. A remote injector uses only standard water supply fittings.

MAINTENANCE IS SIMPLIFIED and virtually eliminated. All parts are corrosion resistant, mounted in an attractive modern cabinet.

For full details on manual or automatic proportional V-notch Chlorinators, contact your W&T representative, or write to the address below.

A New Development from Wallace & Tiernan Research

WALLACE & TIERNAN INCORPORATED

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

S-112

ELECTRO RUST-PROOFING
CORPORATION
30 MAIN STREET, BELLEVILLE 9, N. J.

Davis & Ferguson. Medical building and pharmacy. $110,000. Client, Dr. J. P. Ewing, Northridge, Calif.

Automobile sales agency, including sales building, offices, service building, parts department, and used car area. $120,000. Client, Town & Country Motors, Reseda, Calif.

Leroy F. Greene. Tulare County Courthouse and office building, Visalia, Calif. Four-story building, 150,000 sq ft; all-welded steel frame resisting vertical and earthquake forces. $3,000,000. Client, Horn and Mortland, Associate Architects.

W. H. Hermes, III and Geo. W. Dunn, Associate. New library, city of Escondido. $10,000 mechanical ($60,000 total). Client, Architect.

Administration and shop building, 11th Naval District. $45,000 mechanical ($336,000 total). Client, Architect.

Rehabilitate galley, 11th Naval District. $39,000 mechanical. Client, Architect.

San Pasqual School, Escondido, Calif. Complete new heating plant and system. $85,000 mechanical. Client, Owner.

Two Kindergartens, San Diego. $55,000 mechanical. Client, Architect.

COLORADO

Ken R. White. Platt River Water Development, consisting of treatment plant, pumping station, sedimentation basin, 4.5 million gal storage tank and 121,000 ft of pipe. $3,000,000. Client, City of Aurora, Colo.

Associated Engineers. New dial telephone system, including 400 miles new line construction and associated dial equipment offices. Client, Delta County Tele. Corp., Inc., Paonia, Colo.

Tipton and Kalmbach, Inc. Extension of Jones Pass transmountain diversion. $6,000,000. Client, Board of Water Commissioners, City and County of Denver, Denver, Colo.

Ranch Creek transmountain diversion. $4,600,000. Client, City of Englewood.

Miner and Miner, Consulting Engineers, Inc. Two 115-12.5/7.2 kv substations near Fort Morgan, Colo. $150,000. Client, Morgan County Rural Electric Association.

Electric power 115 kv extension to Glen L. Martin Co.—Denver facility. $1,250,000. Client, Colorado Central Power Co., Englewood, Colo.

Ib Falk Jorgensen, Consulting Engineer. Engineering and Physics Center, Colorado A&M, Ft. Collins, Colo. All reinforced concrete. Lecture hall — rigid frames 72 ft—and four, three-story concrete buildings — steel curtain walls. $1,750,000. Client, James M. Hunter, Architect.

CONNECTICUT

Dr. D. B. Steinman and R. M. Boynton, Associate. Design and construction supervision for Section 17 of Connecticut Turnpike. Client, State of Connecticut.

Fred S. Dubin Associates. Traffic con-

For Most Economical Operation

Transmit electric power at higher voltage and install

SORGEL

Substations at load centers

•

Saves Copper. The Substation can be placed near the load center, so that shorter secondary feeders and smaller primary wires can be used. Improved voltage regulation.

Speeds Expansion and Earlier Production. Sorgel substations are shipped complete in one or more factory-assembled units, on a substantial steel base, completely wired and tested, ready for installation and final connection. This saves the extra expense of buying separately the transformers, switches, fuses, insulators, circuit breakers, and other accessories; also saving the extra labor cost and trouble assembling and connecting on the job.

Quiet Operation. The sound level of SORGEL dry-type transformers is well below the established standards. They are particularly adaptable for any indoor installation; in hospitals, libraries, schools, institutions, office buildings, and other structures where low sound levels are an important factor.

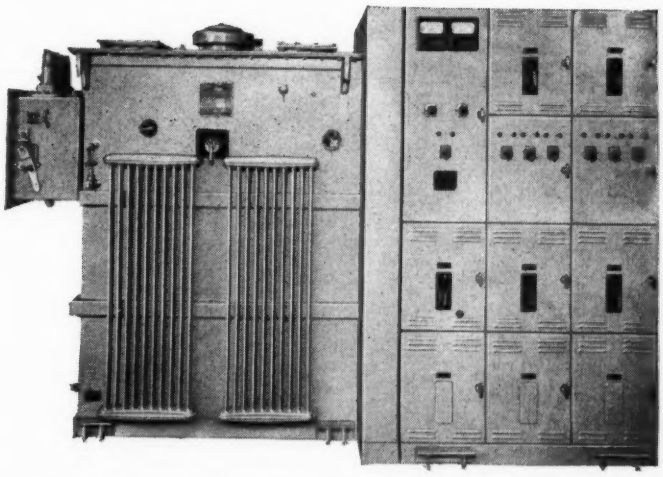
Types. Either dry-type or Askarel-cooled transformers are available with any type or make of switchgear, or from any substation manufacturer.

Sizes up to 3000 Kva. All voltages up to 15 KV.

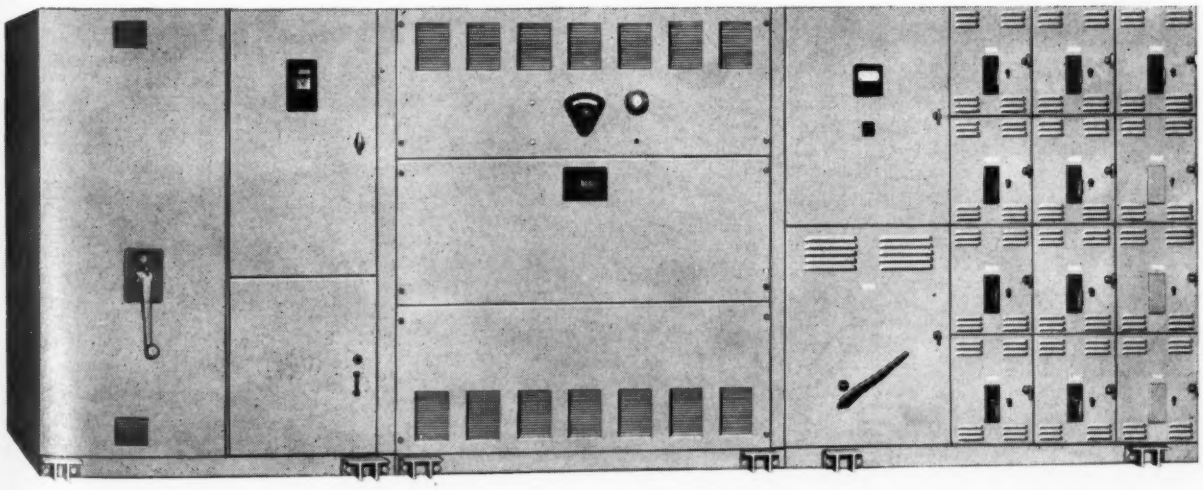
"Packaged" Units for Indoor Installations

Engineered to meet your exact requirements

Not necessary to design or change your installation to fit a "standard"



500 Kva 13,800 volt Askarel-cooled SORGEL transformer, with primary liquid filled switch, secondary meters, and circuit breakers.



2000 Kva 3-phase, 13,200 volts dry-type transformer, with primary switchgear, metering, and secondary breakers.

Sales Engineers in Principal Cities

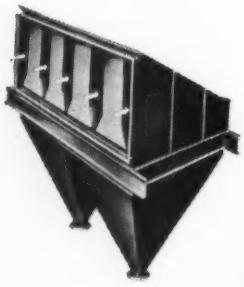
SORGEL ELECTRIC CO., 843 West National Ave., Milwaukee 4, Wis.

40 years' experience in the development, manufacturing and application of transformers

Your plant and equipment suffers . . . your community goodwill fades away. These problems can be solved. Prat-Daniel Collectors are designed for the control of industrial dusts and flyash. Multiple small diameter tubes provide powerful centrifugal forces, resulting in sustained high collection efficiency . . . even with ultra-fine dusts.

Whether the problem is industrial dust or flyash, you are assured of satisfaction with P-D Collector Systems, engineered to meet your specific needs.

Write for Reprint No. 102 titled, "What Type Collector?"



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Project Engineers
THE THERMIX CORPORATION
GREENWICH, CONN.
(Offices in 38 Principal Cities)
Canadian Affiliates: T. C. CHOWN, LTD., Montreal 25, Que.

Designers and Manufacturers
PRAT-DANIEL CORPORATION
SOUTH NORWALK, CONN.
POWER DIVISION: Tubular Dust Collectors, Forced Draft Fans, Air Preheaters, Induced Draft Fans, Fan Stacks

trol survey, East Hartford, Conn. Client, Travelers Insurance Co.

University of Connecticut, Fine Arts Center, plumbing, heating, ventilating, electrical. $1,800,000. Client, architect, Maurice Golden.

St. Johns School, Deep River, Conn., plumbing, heating, electrical. $350,000. Client, architect, Arthur Thomas.

Tonic office building, Greenwich, Conn. $350,000. Client, architect, Sternbach & Reime.

De Leuw, Cather & Brill. Report on location and estimate of construction cost for four new bridges over the Connecticut River in the vicinity of Hartford, Conn. $38,000,000. Client, Greater Hartford Bridge Authority.

Greenhut & Taffel. Supervision of construction on Connecticut Turnpike, Saybrook to Westbrook, Conn. $5,000,000. Client, State of Connecticut.

DELAWARE

Fred S. Dubin Associates. Howard Johnson Motor Lodge, Wilmington, Del. Plumbing, heating, air conditioning, electrical. $300,000. Client, architect, Carl Koch Assoc.

K. T. Korn. Reorganization of aircraft components manufacturer's plant in Delaware. Client, Confidential.

FLORIDA

De Leuw, Cather & Brill. Sunshine State Parkway, Fla., Section 19. Design and supervision of construction for 13 miles of Toll Highway. $4,000,000. Client, Florida State Turnpike Authority.

Russell & Axon. Comprehensive report on water works improvements. $900,000. Client, City of Lake Worth, Fla.

Comprehensive engineering report on water works improvements and sewage collection and sewage treatment facilities. $300,000. Client, Town of Lantana, Florida.

Engineering report on interceptor sewers and sewage treatment facilities. $350,000. Client, City of Wauchula, Fla.

GEORGIA

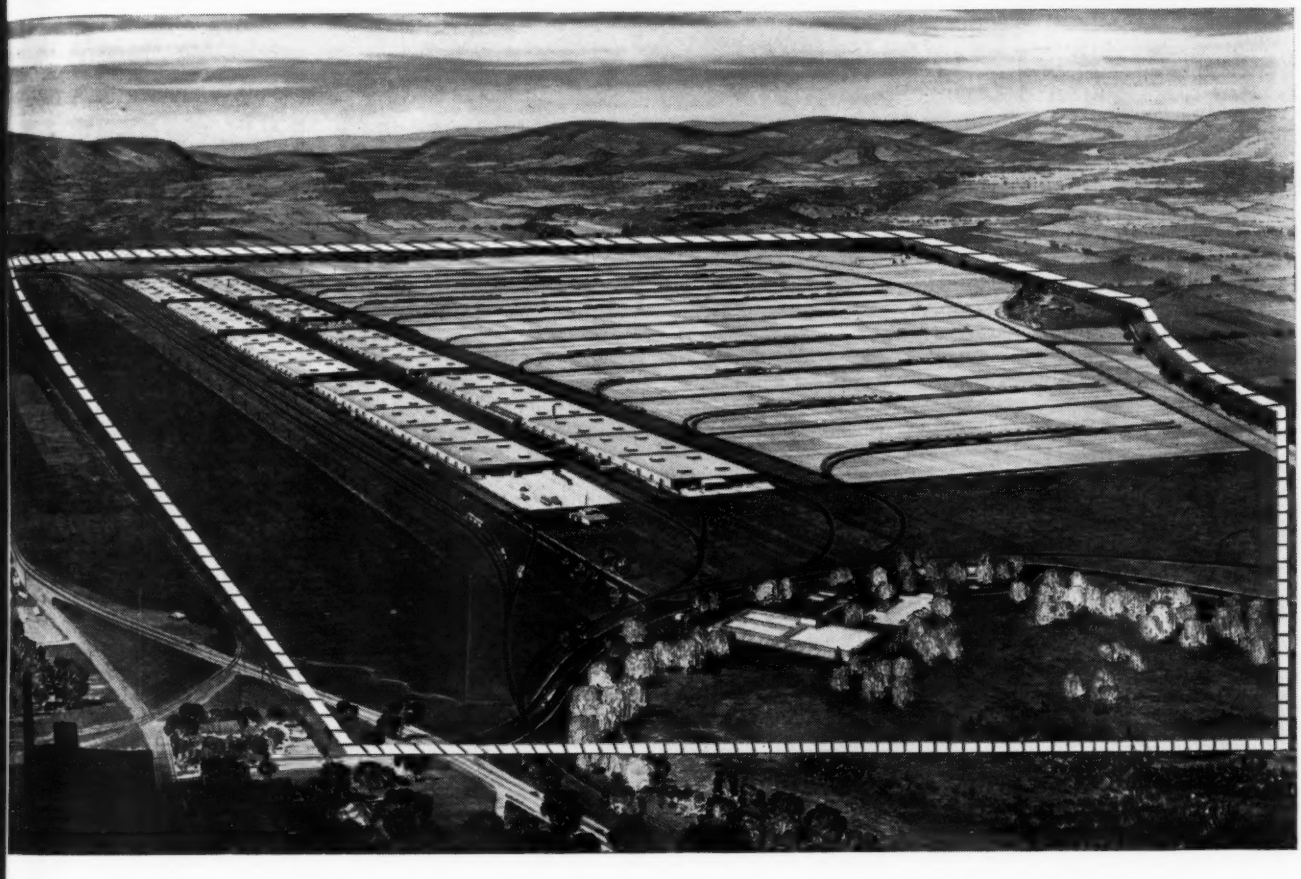
Thomas E. Blakley Associates. Power survey of existing electrical distribution system, investigation of new system voltages available, voltage regulation, rates, and a suggested preliminary design of a new distribution system. Atlanta, Ga. Client, Sears Roebuck & Company.

R. Berl Elder. Girls' high school, Macon, Ga. Electrical design for complete new campus with three classroom wings, auditorium, gymnasium, lunch room, and remote equipment building. $750,000. Client, Hall & Ferguson, Architects.

IDAHO

Associated Engineers. New dial telephone system, including 200 miles new line construction and associate dial equipment offices. $210,000. Client, Proj. Mut. Tel. Coop., Inc., Rupert, Idaho.

YOUR NEW PLANT WILL GROW IN THE ERIE AREA



HORSEHEADS, NEW YORK, INDUSTRIAL CENTER

A New Concept in Manufacturing and Distribution

Here is a new service of interest to every American manufacturer. Horseheads Industrial Center, near Elmira, New York, now offers manufacturing sites, warehousing facilities and distribution service from a single area.

Originally developed by the Army, as the most strategic point to assemble, hold and ship goods, the area has been converted for industrial use. It is now in operation.

Among the many advantages are:

New plant sites, constructed to your requirements, for lease or sale, on terms to fit your financial structure. 500 improved acres are available.

Unexcelled warehousing facilities . . . over one and a half million square feet of enclosed space. You can ship your products in bulk or in subassemblies; process, assemble, pack and ship them from the Center.

You can reach major markets overnight, consolidate carloads, reship, save on imports and exports, give faster service.

The Erie, supplying this new development with dependable transportation between New York and Chicago, will be glad to supply further details in strictest confidence. The coupon below will receive immediate attention.

Erie Railroad

DEPENDABLE SERVICE FOR THE HEART OF INDUSTRIAL AMERICA

D. M. Lynn, Assistant Vice President
Industrial Development
Room 524-K, Erie Railroad
Midland Building, Cleveland 15, Ohio

Dear Sir: Please furnish us, in strict confidence, additional information on the above and other plant sites in the Erie Area.

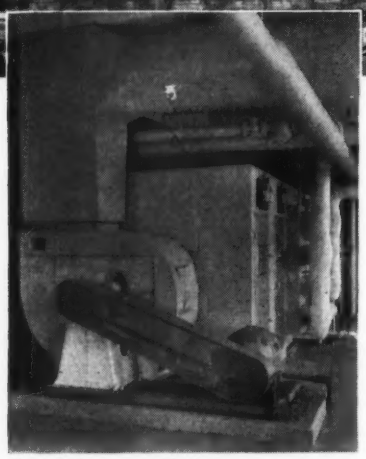
Name _____

Title _____ *Company* _____

Address _____

City _____ *Zone* _____ *State* _____

New Henry Ford Hospital Clinic, Detroit, Mich. (background). Voorhies, Walker, Smith & Smith, Architect-Engineers; R. L. Spitzley Company, Mechanical Contractors; George A. Fuller Company, General Contractors.



"Buffalo" ventilating fan moving air through a Carrier Corp. Weathermaster System. This modern conduit type system requires fan operation up to 6" static pressure.

NEW HENRY FORD HOSPITAL CLINIC ENJOYS QUIET VENTILATION WITH "BUFFALO" FANS

Hospital ventilation demands quiet, dependable, 24-hour a day fans. In this new clinic over 100 "Buffalo" units are located throughout the building. Large installations are on the 2nd, 5th and 17th floors, a fact patients never discover since there is no fan noise or vibration, even in areas directly adjacent to these installations.

Low noise level is but one of many reasons why "Buffalo" ventilating fans are overwhelmingly preferred in our modern air-conditioned buildings. Reliable operation and rated performance are further inducement for you to insist on "Buffalo" "Q" Factor* Air Handling Equipment for your important air jobs.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

Same as above, 150 miles of line. $600,000. Client, Owyhee Tele. Co., Inc., Wilder, Idaho.

Same as above, 150 miles of line. $120,000. Client, Aberdeen Tele. Co., Inc., Aberdeen, Idaho.

ILLINOIS

Harza Engineering Co. Illinois Toll Highway, section T-5, Tri-State route in northern Illinois. $7,000,000. Client, Illinois State Toll Highway Commission.

W. B. Dolphin, General Engineers & Designers. Complete remodeling and alteration program for the home office building, including new executive offices, new lighting, heating, and air conditioning systems, new hydraulic elevator, and porcelain enameling facing on building. Chicago, Ill. $300,000. Client, Supreme Liberty Life Insurance Company.

S. Alan Baird. Outdoor refrigerated skating rink, 85 x 185 ft, swimming pool, bath and skate change house, Peoria, Ill. Park Board. $250,000. Client, Leslie Kenyon, Architect.

Grade school, Forrest, Ill. $320,000. Client, Foley, Hackler, Thompson & Lee, Architects.

100 ton air conditioning for a department store, Rockford, Ill. $75,000. Client, Owner.

Wolfe Sagalovitch and Edwin Hancock Engineering Co., Lockport, Ill. sewage treatment plant. New primary treatment with sludge digestion and sludge beds. Design flow 1.2 mgd. Client, City of Lockport, Ill.

Wm. T. Hooper. Intake for water treatment plant. North Chicago, Ill., 42 in. dia concrete pipe, 6500 ft long. $500,000. Client, City of North Chicago.

INDIANA

Paul J. Kleiser & Associates. Third addition to Robinwood, a subdivision in Lost Creek Township, Vigo County, Terre Haute, Ind.

IOWA

E. L. Patera Sr. & Jr. Complete new water works system. $96,000. Client, Town of New Market, Iowa.
Complete new water works system. $100,000. Client, Town of Murray, Iowa.

Complete new water works system. $87,000. Client, Town of Batavia, Iowa.

KANSAS

The Ediger Engineering Co. Sewage treatment plant, Medicine Lodge, Kans. $175,000. Client, City of Medicine Lodge.

Street improvements, El Paso (Derby), Kans. $230,000. Client, City of El Paso (Derby), Kans.

Sewage treatment plant, Sedgwick, Kans. $110,000. Client, Sedgwick.

Jack Beers, Consulting Engineer & Architect. Evangelical United Brethren Church, Bern, Kans. $100,000.

Why Arizona Public Service chose Triple-Zone Gilsulate to protect 1200-foot fuel and steam lines

Sought lifetime protection against heat loss and corrosion

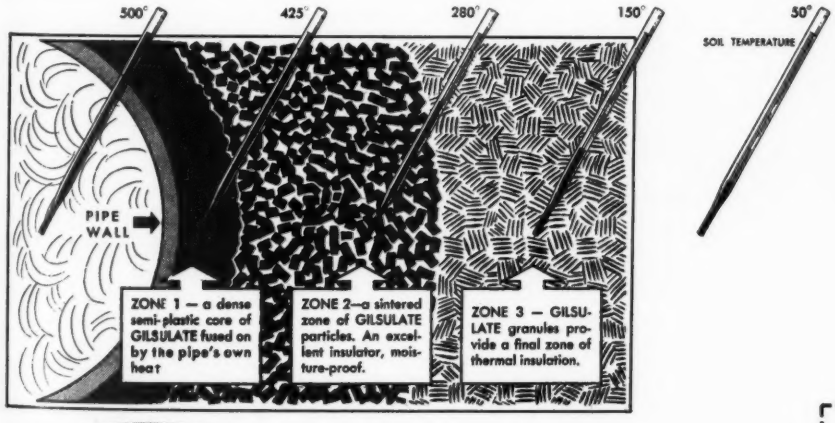
For its new Saguaro steam electric station near Red Rock, Arizona, the Arizona Public Service Company investigated several types of hot underground pipe insulation. The pipe system consists of three seamless carbon steel hot fuel and steam lines, totalling 1,200 feet, with welded joints running side by side between a 55,000-bbl. fuel oil storage tank and two 950,000 pound/hour steam generators.

Arizona Public Service Company found that GILSULATE gave the quickest, simplest and most economical system of insulation for its underground hot fuel and steam lines. Approximately 40 tons of GILSULATE were poured and tamped by 10 laborers in two 8-hour shifts – far less time and less expense than required for the other types of insulation investigated.

This is the experience of hundreds of other installations – *Triple-Zone GILSULATE shows the lowest cost per installed linear foot of any hot underground pipe insulation!*

Facts about Gilsulate

1. *Easy to use*—just pour, tamp and backfill…pipe heat does the rest.
2. *Forms 3 zones of protection* against heat loss and all commonly encountered hazards to hot buried pipes.
3. *Needs no sleeves* or mechanical sheaths: no mixing or special handling.
4. *Needs only* normal pipe spacing: for multiple pipe or cramped conditions.
5. *3 types* for varying temperature ranges up to 520° F.


500°
425°
280°
150°
50°
SOIL TEMPERATURE
PIPE WALL
ZONE 1 — a dense semi-plastic core of GILSULATE fused on by the pipe's own heat
ZONE 2—a sintered zone of GILSULATE particles. An excellent insulator, moisture-proof.
ZONE 3 — GILSULATE granules provide a final zone of thermal insulation.

Lines include five horizontal expansion U-bends. A 6-in. fuel oil supply line, a 4-in. fuel oil return, and a 4-in. saturated steam line leading to the fuel oil tank heater were placed side by side in a 37-in. wide trench, and covered with GILSULATE. After light tamping of GILSULATE, trench was backfilled—and the work was done.

THE TRIPLE-ZONE INSULATION FOR LIFETIME PROTECTION OF HOT UNDERGROUND PIPES

GILSULATE®

AMERICAN GILSONITE COMPANY, SALT LAKE CITY 1, UTAH
Affiliate of Barber Oil Corp. & Standard Oil Co. of California

American Gilsonite Co.
134-M West Broadway, Salt Lake City 1, Utah
or
1145 East Jersey St., Elizabeth, N. J.

Send me more information on GILSULATE Insulation

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

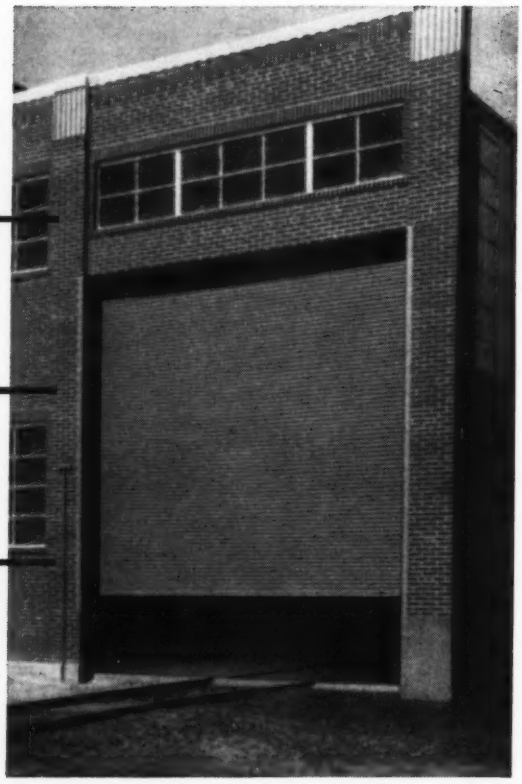
CE

Doors open straight upward--no space is wasted anywhere

Maximum protection against theft, riot intrusion, vandalism

Every door is REGISTERED[1] for your protection

Extra-heavy zinc coating, for lasting weather resistance[2]

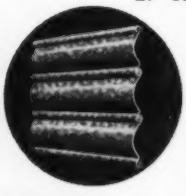


Kinnear Rolling Doors

You get *more* protection plus *more* efficiency in Kinnear Rolling Doors. Coiling above the doorway, they open out of the way! They never block light from close-by windows or fixtures. No floor, wall, or ceiling space is sacrificed. Hoists, conveyors, high-lift fork trucks and similar equipment can be used to maximum advantage.

1. Details on every Kinnear door are REGISTERED—kept in fire-safe vaults. Damaged or worn parts are *permanently* replaceable. Your Kinnear Door is never "orphaned."

2. Kinnear's rugged interlocking-slat curtain is heavily galvanized (1.25 ounces of pure zinc per sq. ft., A.S.T.M. Standards). In addition, the special Kinnear Paint Bond assures immediate, thorough coverage and adhesion of field-applied paint.



Kinnear Rolling Doors are engineered to fit any need, with manual-lift, crank, chain or electrical operation. Controls for motorized doors can be placed at any number of convenient spots. For long, low-cost service, insist on Kinnear Rolling Doors! *Write for catalog.*

The KINNEAR Mfg. Co.
FACTORIES
1560-90 Fields Ave., Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif.

KINNEAR
ROLLING DOORS
Saving Ways in Doorways

LOUISIANA

Howard, Needles, Tammen & Bergendoff. New Orleans Interstate Highway, LaPlace and Frenier to New Orleans. $200,000,000. Client, State of Louisiana.

Forrest and Cotton. Feasibility report on Toledo Bend Dam and Reservoir on Sabine River. Client, Sabine River Authority of Texas, Sabine River Authority of Louisiana.

R. W. Beck and Associates. Design of additions to the water system for the City of Lafayette including 830,000-gal reinforced concrete ground level reservoir $100,000; 100,000-gal concrete receiving reservoir $75,000 (est.); 3 MGD rapid treatment equipment installation in existing settling basin $45,000 (est.); 1 MGD (rated capacity) filter addition $60,000 (est.). Client, City of Lafayette, Louisiana Utilities System.

Mario Zervigon & Assoc. Floodlighting the Tulane (Sugar Bowl) Stadium for night games. Six steel towers 189 A high, 480 narrow beam (15 deg.) 1500 w floodlights, New Orleans, La. $150,000. Client, Tulane University.

Fluor Corp., Ltd. Design, engineering, and construction of delayed coking and calcining unit of approx. 10,000 barrels per day capacity. $6,250,000. Client, Lake Charles Chemical Corp.

MARYLAND

Thomas S. George. St. Pius X Roman Catholic Church, Baltimore, Md. $400,000. Client, F. E. Tormey, Jr., Arch.

Baker Memorial Library, Western Maryland College, Westminster, Md. $400,000. Client, Adams & Rigg, Arch.

Robert Craighead Walker. Assateague Island Toll Bridge across Sinepuxent Bay from South Point on the mainland of Worcester County, to Ocean Beach and South Ocean Beach, Baltimore Boulevard on Assateague Island, Md. $1,000,000 (est.). Client, Assateague Island Bridge Corp.

Pressure treated wood-pile bents supporting timber superstructure. Single-leaf bascule lift span at channel.

John K. M. Pryke, Consulting Engineer. Cathedral, Baltimore, Md. $8,000,000. Client, Maginnis, Walsh & Kennedy.

Lutz & Scheible. Junior-Senior High School, Chesapeake City, Md. Typical school construction, hot water heat. $1,500,000. Client, Cecil County School Board.

MASSACHUSETTS

Fred S. Dubin Associates. Concord, Mass. Elementary Schools (2). plumbing, heating, electrical. $700,000. Client, architect, Hugh Stubbins Assoc.

Animal Rescue League, Boston, Mass. Plumbing, heating, ventilating, air conditioning, electrical. $480,000. Client, architect, Hugh Stubbins Assoc.

John K. M. Pryke, Consulting Engineer. Jordan Marsh Store, Boston, Mass. $3,500,000. Client, Allied Stores Corp.

PERFORMANCE VERIFIED / by acid test

Even before a Powell Valve is made, it must pass the acid test. For quality control of Powell Valves begins not with manufacture—but with the very materials which go into Powell Valves.

Constant laboratory control is one of the many ways we make certain that Powell Valves will give dependable flow control. Another is the final step of manufacture of these precision-built valves: *every Powell Valve is subjected to an actual line test.*

Because of Powell's painstaking quality control, valve repair is cut to the minimum and plant shut down through valve failure is substantially reduced. Records of performance the world over prove it.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our COMPLETE *quality line* which has PERFORMANCE VERIFIED.

The Wm. Powell Company, Cincinnati 22, Ohio . . . 110th YEAR

PERFORMANCE PV VERIFIED

FIG. 3003 WE—Steel Gate Valve For 300 Pounds W.S.P.

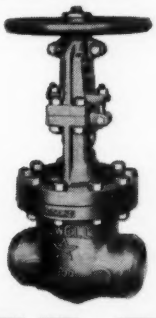


FIG. 11365—Steel Pressure Seal Horizontal Lift Check Valve For 1500 Pounds W.S.P.

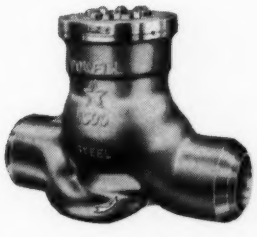


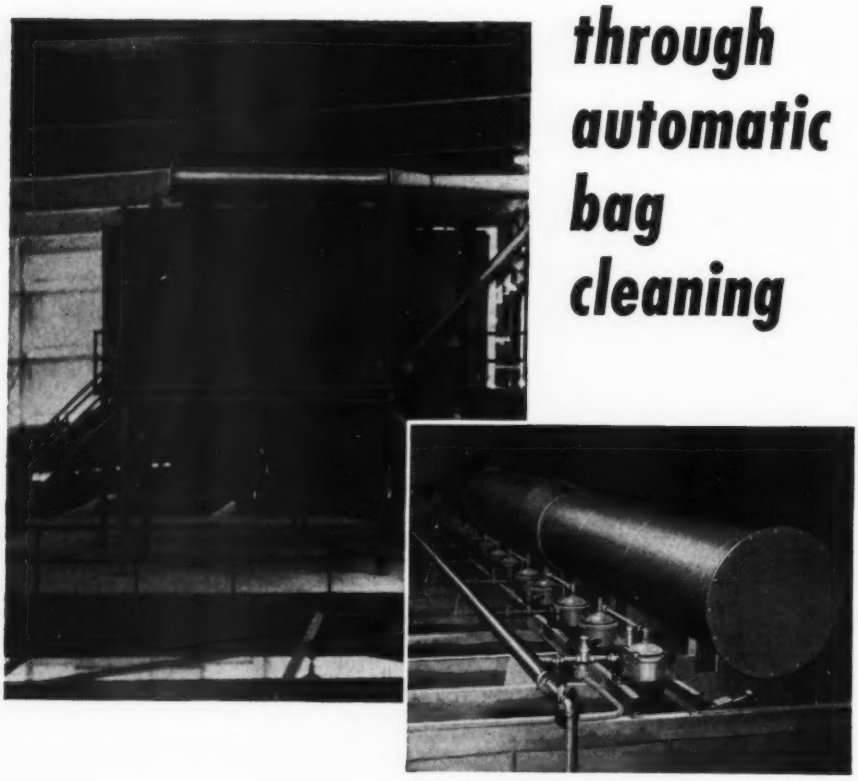
FIG. 11323—1500-Pound Motor Operated Steel Pressure Seal Gate Valve.

POWELL VALVES

BRONZE, IRON, STEEL AND CORROSION RESISTANT VALVES.

Norblo gives you continuous peak-load Dust Collection

through automatic bag cleaning



Plants running full blast can ill-afford down time for equipment repairs and maintenance. Dust collection around the clock without interruption is commonplace with Norblo Automatic Bag Type Arresters.

Complete time-cycles for progressive automatic bag shaking are controlled by highly efficient electric timers. Only one compartment is cut out at a time, and that for just a few seconds, with *no* drop in efficiency for the installation as a whole. Norblo's compartment construction is the time-saving solution to inspection, maintenance and repair in busy plants . . . For "good housekeeping" or for salvage, Norblo Automatic installations have many design advantages wherever continuous high recovery of industrial dusts and fumes is important.

It pays you to write at once for latest information on Norblo Automatic Bag Type Dust Arrester that assures constant high efficiency dust handling.

THE NORTHERN BLOWER COMPANY

6426 Barberton Ave., Cleveland 2, Ohio OLympic 1-1300

Norblo ENGINEERED DUST COLLECTION SYSTEMS FOR ALL INDUSTRIES

De Leuw Cather & Brill. Relocation of 12 miles of railroad in Connecticut and Massachusetts. $4,000,000. Client, Corps of Engineers, Boston, Massachusetts.

MICHIGAN

Steven Antonoff & Associates. Highway grade separation on Detroit Industrial Highway carrying Belleville Road over M-112 north of Belleville in Wayne County. $175,000. Client, Mich. State Hwy. Dept.

Highway grade separation carrying West Road over Detroit-Toledo Expressway west of Trenton in Wayne County. $155,000. Client, Mich. State Hwy. Dept.

Hixson, Tarter & Associates. Warehouse and office building, Livonia, Mich. $5,000,000. Client, The Kroger Co.

John R. Snell & Associates. Water supply and softening plant. Village of Ashley, Mich. $130,000. Client, Village of Ashley.

John C. Norton & Associates. Parking (municipal). $25,000. City of St. Ignace, Mich.

Storm sewers. $100,000. Client, City of Frankfort, Mich.

Storm sewers. $50,000. Client, Village of Elk Rapids, Mich.

Storm sewers, sanitary sewers, water main extensions, curb and gutter. $150,000. Client, City of Manistee, Mich.

Hamilton, Weeber & Ward. Turbine plant extension for 7500 kw turbine generator and circulating water improvements. $1,000,000. Client, Board of Public Works, City of South Haven, Michigan.

Wesley Bintz. Combination indoor-outdoor swimming pool located about 2 miles out of Buchanan, Mich. Outdoor pool is 40 x 60 ft and indoor pool is 30 x 40 ft rectangular BINTZ Pool in an over-all structure of 50 x 60 ft. $65,000 (est.) Client, Boy Scouts of America.

MINNESOTA

Ballinger-Meserole Co. 200,000 sq ft distributing warehouse for finished products. Client, Minneapolis-Honeywell Regulator Co., Minn., Minn.

Nielsen and Bruch. Addition to St. Mary's Hospital, Minneapolis, Minn. Basement and seven-story addition to include administration, operating and delivery suites, laboratory, X-ray dept., out-patients, therapy and patients' rooms. General, mechanical, and electrical work. $6,000,000 (est.) Client, Hills, Gilbertson and Hayes, Architects.

Richard W. Evans & Associates. Eight-story addition and remodeling for Federal Reserve Bank, Minneapolis, Minn. Air conditioning and mechanical work, $1,200,000. Total project cost, $5,000,000. Client, Larson & McLaren, Architects.

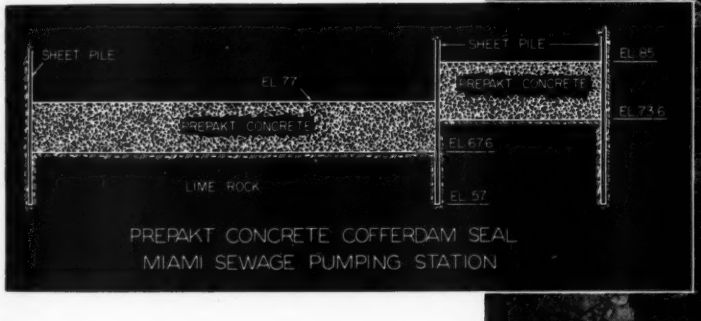
MISSOURI

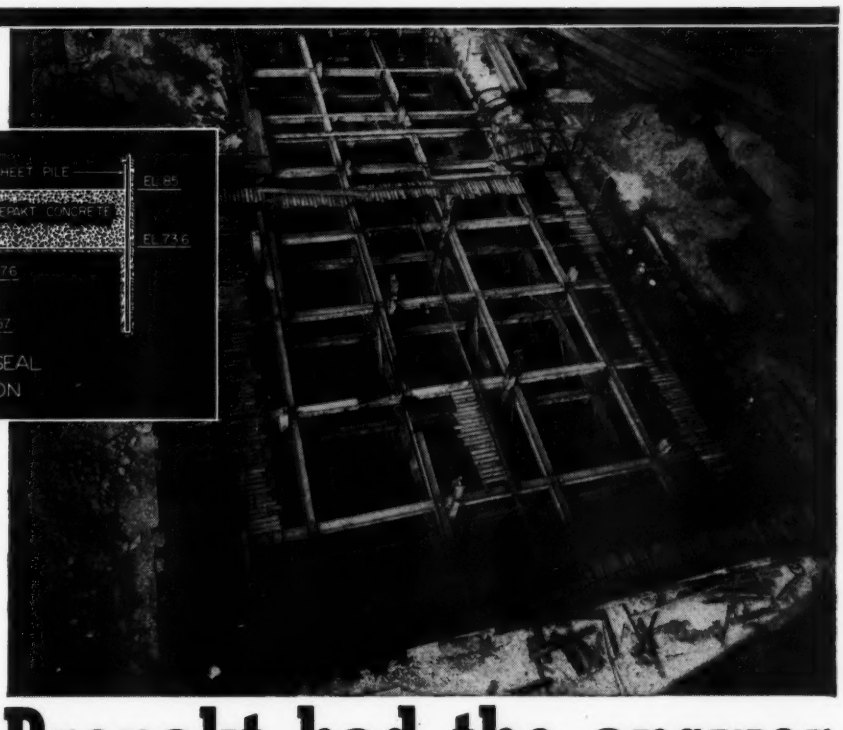
Allgeier, Martin & Associates. Joplin Municipal Airport. Extensions to and construction of runway, taxiway, and

Owner: City of Miami, Florida
Engineers: Connell & Rader Associates, Miami
Contractor: DeFonce Construction Co., Inc.

EXCAVATION FULL OF WATER **was situation met by INTRUSION-PREPAKT. This was the best that usual dewatering methods could do.**

Conventional dewatering methods failed





DRY COFFERDAM **was produced by underwater placement of PREPAKT concrete cofferdam seal, later used as base for the structural slab of the building.**

but Intrusion-Prepakt had the answer

INTRUSION-PREPAKT solved a difficult dewatering problem at the N. E. 9th St. Sewage Pumping Station, Miami, Florida. A close-to-the-surface water table plus a porous lime rock substrata produced a water flow that the contractor could not lick with usual methods.

A PREPAKT concrete cofferdam seal, placed underwater directly on rock, provided a water-tight joint and a tight structural tie-in with the sheet piling. This halted water leakage and resulted in a dry cofferdam.

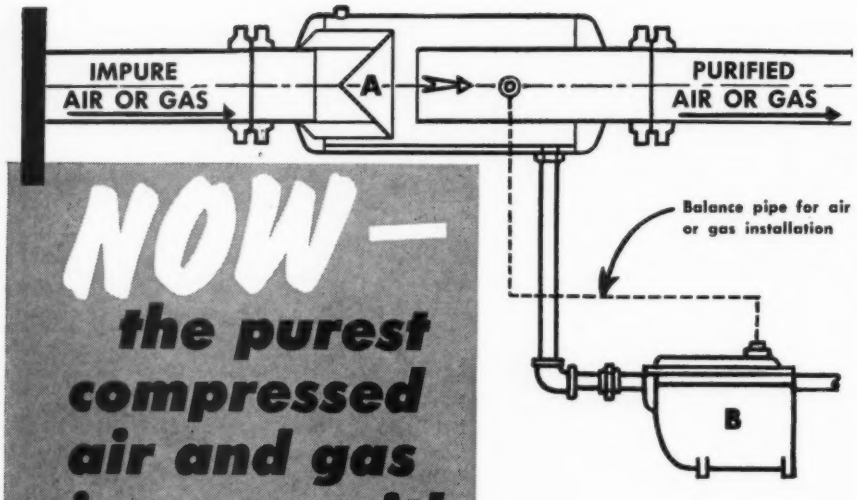
PREPAKT concrete is made by consolidating preplaced aggregate with INTRUSION mortar—a method which eliminates dilution and other weaknesses to give a strong, monolithic structure. On this job, the PREPAKT seal withstands a 36-foot hydrostatic head. Made underwater or in the dry, PREPAKT concrete is of superior quality, has virtually no shrinkage, embeds reinforcing thoroughly and seals without need for after-grouting.

To save time and money on your next difficult foundation or structural concrete problem, contact: INTRUSION-PREPAKT, Inc., Room 779-N, Union Commerce Bldg., Cleveland 14, Ohio. In Canada: INTRUSION-PREPAKT, Ltd., 159 Bay St., Toronto, Ontario.

INTRUSION-PREPAKT, INC.

OFFICES IN PRINCIPAL U. S. AND FOREIGN CITIES

Intrusion and Prepakt are trade marks of Intrusion-Prepakt, Inc., whose methods and materials are covered by U. S. Patents Nos. 2313110, 2655004, 2434302 and others, also patents pending.

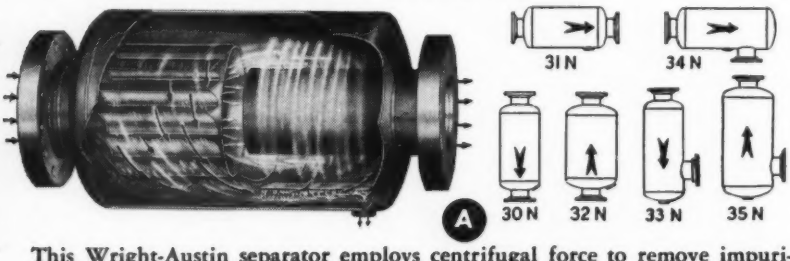


NOW— the purest compressed air and gas is yours with this W-A equipment

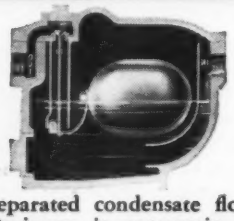
GUARANTEED TO REMOVE 99% OR MORE OF ENTRAINED MOISTURE AND SOLIDS

Where pipe lines carry compressed air and gas, liquids and solids are generally entrained in the gas stream. Wright-Austin 30N Series Separators can be used to remove foreign matter on a wide range of applications. For operating pressures to 5000 PSIG. Line sizes to 24". Here are some typical applications:

REMOVE
- —oil and water from compressed air supply lines
- —oil and water on compressed air service at outlet of inter-cooler and after-cooler equipment.
- —oil, moisture and tar between stages in coke oven gas compressors
- —oil and water from CO_2 gas lines
- —oil and water from hydro-carbon lines
- —entrainment from vapor lines following evaporation



This Wright-Austin separator employs centrifugal force to remove impurities from steam, air or gas flow. The pressure drop is extremely low. Type 31N, as well as other models shown, is light weight, compact and sturdily constructed according to ASME code.



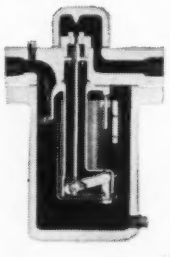
23-AC TRAP (0-125 PSIG)

Separated condensate flows to trap. Drainage is automatic. Particularly adapted where cold, gummy, emulsified cylinder lubricants make ordinary traps inoperative.

B

101-AC TRAP (0-600 PSIG)

Cast steel body, cover and bonnet. Designed for collecting condensate where high pressures are involved. Internal mechanism all attached to cover for easy service.



WA 1894 **WRIGHT-AUSTIN COMPANY**
3245 WIGHT STREET • DETROIT 7, MICH.

WRITE FOR NEW CIRCULAR 506-A

apron facilities. Also installation of medium intensity runway lighting. $300,000. Client, City of Joplin, Mo.

Water and sewerage program. Construction of impounding reservoir, pumping station, raw water line, and treatment plant improvements. Construction of sewer lines, lift stations, and oxidation pond. $350,000. Client, City of Lamar, Mo.

Tanner & Mitchell, Inc. Low rent housing project, 250 units. $3,500,000. Client, PHA of Kansas City, Mo.

MONTANA

Associated Engineers. New dial telephone system, including 400 miles new line construction and associated dial equipment offices. $420,000. Client, Blackfoot Tel. Coop., Inc., Missoula.

Same as above, 80 miles of line. $100,000. Client, Mid. Rivers Tele. Coop, Inc., Circle, Mont.

Same as above, 100 miles of line. $200,000. Client, Project Tele. Co., Inc, Worden, Mont.

NEBRASKA

Jack Beers, Consulting Engineer & Architect. Bethel Evangelical and Reformed Church, Nebraska City, Nebr. $150,000.

Remodeling of Andrews Hall, College of Dentistry, University of Nebraska, Lincoln, Nebr. $80,000.

Pius X Central High School, Lincoln, Nebr. $1,000,000.

Redeemer Lutheran Church, Lincoln, Nebr. $100,000.

Congregational Church of Christ, Ainsworth, Nebr. $90,000.

Reformed Church, Holland, Nebr. $130,000.

St. Mary's Church, Ashland, Nebraska, $63,000.

First Presbyterian Church, Alliance, Nebr. $130,000.

NEW JERSEY

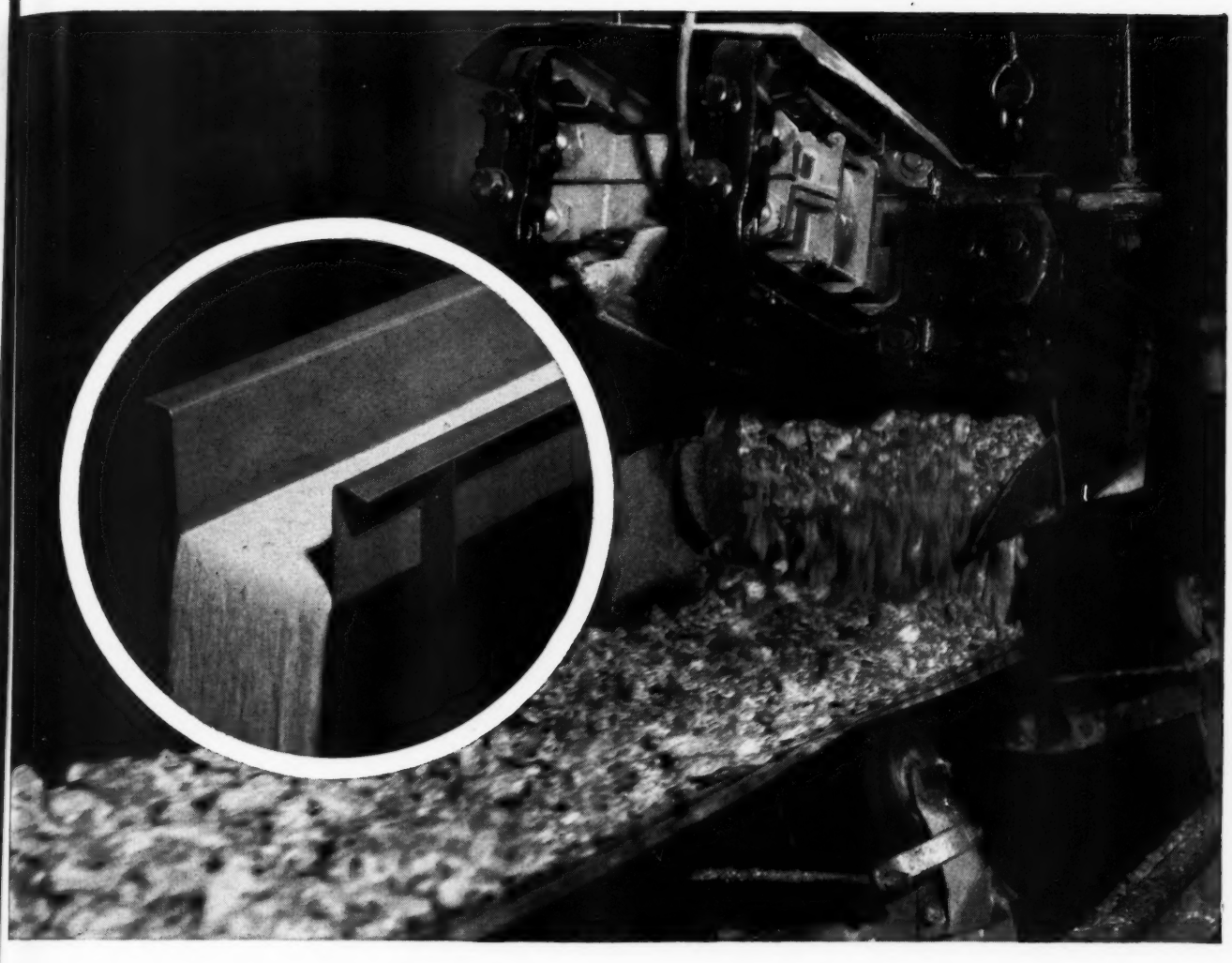
Michael Pope Associates. Survey and engineering report to develop recommendations for the improvement of steam and power generation and distribution. Spotswood, N. J. Client, Peter J. Schweitzer, Inc.

Supervision of design of boiler plant addition and electrical distribution system modernization, Riverside, N. J. Client, Riverside Metal Co. Div., H. K. Porter, Inc.

G. B. Gusrae, Engineering Consultant. Headquarters building, New Jersey Bell Telephone Co., Newark, N. J. Conversion of existing attendant operated elevators to elevators with electronic automatic controls and dispatching system. $600,000. Client, N. J. Bell Telephone Co.

John K. M. Pryke, Consulting Engineer. Mercer Hospital, Trenton, N.J. $4,000,000. Client, Skidmore, Owings & Merrill, New York.

St. Elizabeth Hospital, Elizabeth, N.J. $4,500,000. Client, Eggers & Higgins.



Jeffrey puts VIBRATION to useful work

YOU can solve many problems of conveying solid materials with Jeffrey Electric Vibrating Feeders. Move fine powders or huge stone blocks . . . a few ounces or two thousand tons per hour . . . dripping wet or bone dry . . . at temperatures ranging from 30° below zero to 2,000° above. Materials are propelled in a smooth, continuous stream by each forward vibration stroke.

Balanced vibration in the Jeffrey system matches electrical frequency to natural mechanical frequency of the driven equipment. This makes the system highly economical to operate, since all available energy does useful work. It is easy to control, safe, quiet and dependable. Vibration is scientifically isolated within the conveyor.

Jeffrey's years of experience with conveying problems enable us to furnish systems exactly right for each particular task. Catalog 870 describes the complete line of Jeffrey Vibrating Equipment. For a copy, and for help on your conveying problems, write The Jeffrey Manufacturing Co., Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT • TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

125# Valves...drop tight!

Will not "freeze" from corrosion— *Corrosion can't hinder operation.* Disc edges are chrome plated or stainless steel and close into a thick rubber seat. These features plus self lubricated bearings and stainless steel shafting make it impossible for valves to "corrode tight" either open or shut.

Full 90° closure into Rubber Seat— The disc is slightly larger than the inside of the rubber seat and thus actually displaces the rubber when closed. The ratio of seat thickness to disc indentation insures drop-tight shut off and avoids permanent set. The seats are secured in the valve body by removable keeper segments.

Saves space. Even these high pressure valves are compact, easy to install, and require little head room. Available from 10" to 72" diameter in either cast iron or fabricated steel. A variety of operator types can be supplied.

WRITE FOR COMPLETE DETAILS:
"UNDERSTANDING THE BUTTERFLY VALVE" . . BULLETIN 2J
LOW PRESSURE VALVES . . BULLETIN 1J
HIGH PRESSURE VALVES . . BULLETIN 4J

HENRY
PRATT

RUBBER SEAT
Butterfly Valves

Henry Pratt Company, 2222 S. Halsted St., Chicago 8, Ill. Representatives in principal cities

Institute of Advanced Study Housing, Princeton, N.J. $1,200,000. Client, Marcel Breuer.

Greenhut & Taffel. Slum clearance housing project. Twenty-one 16-story apartment buildings, reinforced concrete, Union City, N. J. $30,000,000. Client, Housing Authority, Union City.

NEW MEXICO

Wood & DeLapp. Farmington newspaper building. $120,000. Client, McHugh & Hooker.

M/A Building, #15. $300,000. Client, Kenneth S. Clark.

Components Laboratory. $100,000. Client, Kenneth S. Clark.

G/M Laboratory, Tech. Analysis. $250,000. Client, Kenneth S. Clark.

Crew Readyness. $200,000. Client, Kenneth S. Clark.

G/M Assembly. $600,000. Client, Kenneth S. Clark.

NEW YORK

G. B. Gusrae, Engineering Consultant. Parents Magazine Building, New York City. Conversion of existing attendant operated elevators to elevators with electronic automatic controls and dispatching system. $220,000. Client, Parents Magazine, Inc.

Loft and office building, New York City. Elevator conversion. $60,000. Client, 524 Broadway Corp.

Hotel Century, New York City. Elevator conversion. $60,000. Client, Hotel Century.

Printing plant, Watchtower Bible & Tract Society, Brooklyn, N. Y. New elevator installation. $135,000. Client, L. Freeland Fellgraff, Architect.

Roberts and Schaefer Co. Complete design, specifications, and supervision for cargo-passenger terminal to be occupied by Holland-America Lines, New York City. $16,700,000. Client, Dept. of Marine & Aviation, City of New York.

Jacob Feld. Solomon R. Guggenheim Foundation Museum, New York City. Structural and general consultant. $3,000,000. Client, Frank Lloyd Wright.

Donald E. Stearns, Civil & Sanitary Engineers. Survey and engineering report to recommend immediate and long range improvements to overloaded sewer system and sewage treatment plant. Client, City of Ithaca, N.Y.

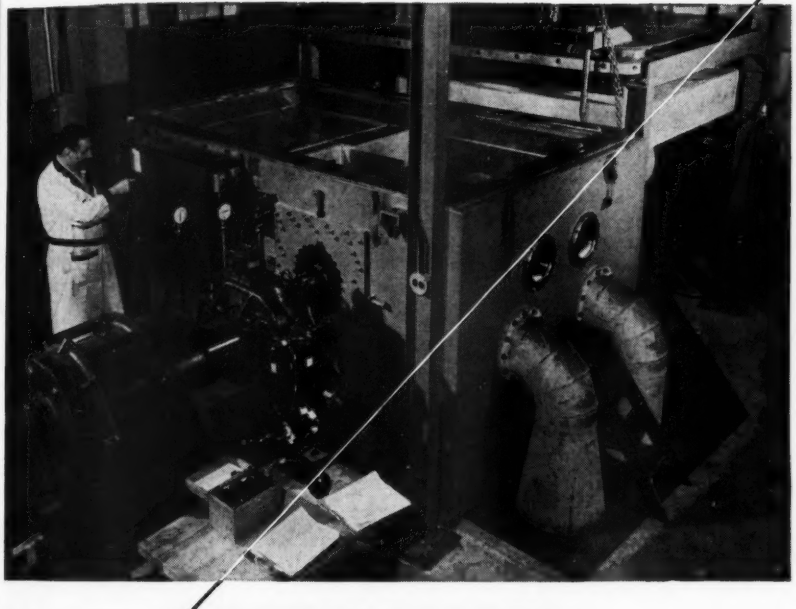
Benjamin L. Spivak. William E. Grady Vocational High School, Brooklyn, N.Y. Mechanical and electrical services for 2400 pupils; 3-story and basement; future fourth floor; 33 shops, 36 classrooms, 3 laboratories, auditorium, gymnasium, and cafeteria. $4,800,000. Client, Board of Education.

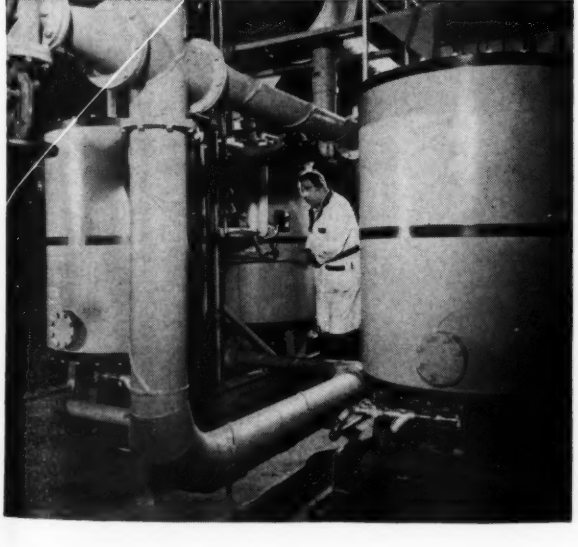
Donald E. Stearns. Survey of water resources. Client, Onondaga County Water Authority, New York.

NORTH CAROLINA

Jacob Feld. Ivy Department Store

Westinghouse altitude chamber simulates flight 23 miles up





▲ *Test chamber, showing motors for driving equipment on test inside.*

◀ *After the two refrigeration units have dropped the dewpoint to 38°, these two Lectrodryers* take it down to −100° F.*

Since temperatures drop below −80° F., air in this test chamber must be DRY

● Electrical equipment for aircraft, product of Westinghouse Electric Corp. at Lima, Ohio, must meet every possible hazard encountered in flight and on the ground. Their laboratory must be able, therefore, to simulate those conditions —even the 80 degrees below zero found 120,000 feet up.

Air at that altitude is DRY, so this Westinghouse laboratory dehumidifies the air blown through this test chamber to a −100° dewpoint. No chance that frost will form and cloud up test results.

For maximum economy in operation, the air is first "rough dried" by a refrigeration unit to 38° dewpoint. Then two BWC-1500 Lectrodryers remove the remaining vaporous moisture to a −100° dewpoint. Tests can be continued day after day, as these driers can be kept on-stream without interruption.

Whether you're DRYing experimentally or on production, there are Lectrodryers to handle the task. For literature on DRYing, write Pittsburgh Lectrodryer Company, 357 32nd Street, Pittsburgh 30, Pennsylvania (a McGraw Electric Company Division).

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In France: Stein et Roubaix, 24 Rue Erlanger, Paris XVI.
In Belgium: S. A. Belge Stein et Roubaix, 320 Rue du Moulin, Bressoux-Liege.

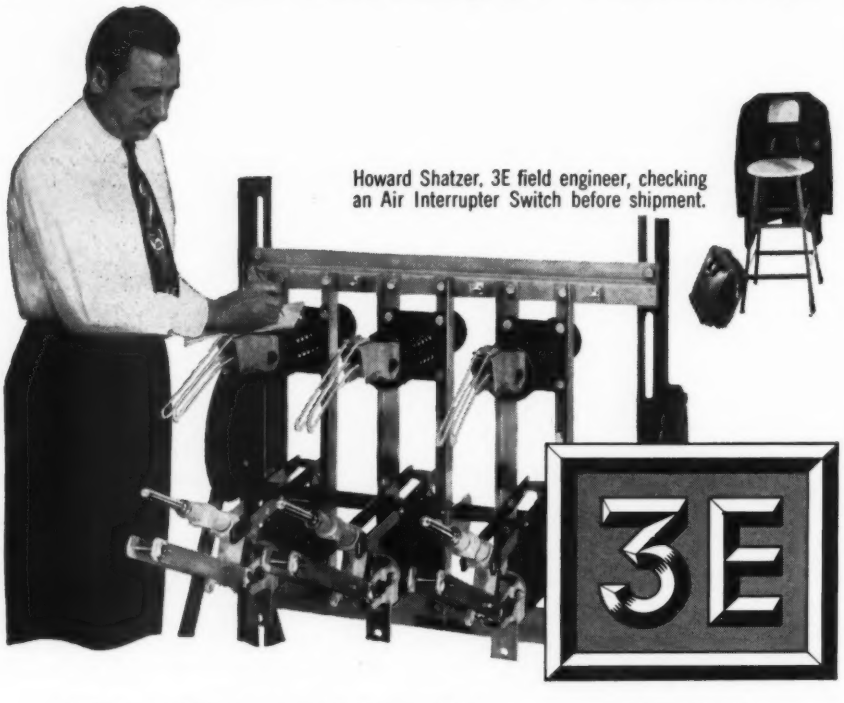
LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

LECTRODRYER

* REGISTERED TRADEMARK U. S. PAT. OFF.

Why be half safe?

Specify AUTO-SPEED interruption . . . 3E Air Interrupter Switches



Howard Shatzer, 3E field engineer, checking an Air Interrupter Switch before shipment.

What is **Auto-speed interruption** . . . an automatically produced interruption that always occurs at the same point in the switching operation, and always takes the same time (one-half cycle). Human error is eliminated from the switching action by a trigger spring mechanism which trips the switch at a pre-set point. Contacts are separated inside a dry type interrupter unit.

Specify safety for personnel and equipment No exposed Arc. 3E Air Interrupter Switches will not produce external arcing dangerous to men or equipment.

Specify economy Costing less than circuit breakers and with interrupting capacity not found in air break disconnects, 3E Air Interrupters are ideal for . . . interrupting magnetizing charging current of transformers . . . interrupting charging current of lines and busses . . . interrupting exciting current of feeder regulators . . . interrupting load currents to rated capacity . . . sectionalizing feeders and distribution circuits.

Specify Engineering Ability 3E's staff of engineers is experienced in adapting or combining equipment for complete switching centers or additions to existing units. Designing for unusual needs . . . corrosive or dusty atmospheres, unique space requirements, portable units, or carefully calculating tomorrow's expansion requirements . . . we are geared to handle the unusual.

Howard Noble, 3E Sales Promotion Mgr., demonstrates Air Interrupters in a complete cubicle installation.

3E Air Interrupter Switches are made in ratings up to 15 K.V.

Write for Bulletin 152

ELECTRICAL ENGINEERS EQUIPMENT CO. Melrose Park, Illinois

Representatives in principal cities—in Canada by Power-Lite Devices, Ltd.

addition, Charlotte, N.C. Structural design. $1,000,000. Client, Leon & Lionel Levy, Architects.

NORTH DAKOTA

Associated Engineers. New dial telephone system, including 1200 miles new line construction and associated dial equipment offices. $1,200. Client, Reservation Tele. Mut. Aid. Corp., Parshall, N.D.

Same as above, 900 miles of line. $1,200. Client, West. Riv. Mutual Aid. Tel. Corp., Hazen, N.D.

Same as above, 300 miles of line. $200,000. Client, Bowman Slope Tele. Mut. Aid. Corp., Bowman, N.D.

OHIO

Uhlmann Associates. Sewage treatment plant. $350,000. Client, City of Piqua.

Intercepting sewers. $300,000. Client, City of Piqua, Ohio.

K. T. Korn. Merger of four companies in unrelated fields, two in northern Ohio, one in southeastern Ohio and one in Ontario, Canada. $5,000,000. Client, Confidential.

OKLAHOMA

V. V. Long & Co. New outfall sewers to serve the east and west sides of the city together with repairs at sewage disposal plant. $315,000. Client, City of Norman, Okla.

Leon B. Senter. St. John's Hospital, west addition, Tulsa, Okla. $2,800,000. Client, Sisters of the Sorrowful Mother.

Bakery and office building, Tulsa, Okla. $1,250,000. Client, Continental Baking.

G. B. Gusrae, Engineering Consultant. Philtower Building, Tulsa, Okla. Conversion of existing attendant operated elevators to elevators with electronic automatic controls and dispatching system. $320,000. Client, Boy Scout Council of America.

PENNSYLVANIA

Fred S. Dubin Associates. Seton Hall (Pa.) Girls Dorm. Plumbing, heating, ventilating, electrical. $300,000. Client, architect, Philip Johnson.

Gordon Thompson residence, Cigonier, Pa. Plumbing, heating, ventilating, electrical. $100,000. Client, architect, Thompson & Steinhardt.

TEXAS

Reaves & Gregory. Sanitary sewerage improvements. $148,000. Client, City of Stephenville, Texas.

Sanitary sewerage improvements—plant and lines. Client, City of Corsicana, Texas.

Richland Terrace Subdivision. Streets, curb and gutter, storm drainage. Client, Centex Construction Co., Dallas, Texas.

Arlington sewage treatment plant. $616,816. Client, City of Arlington, Texas.

Tatum and Quade. Sanger's Preston

NO CHARGE

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You pay nothing extra for DeBothezat's 30 years' experience in solving corrosive fume problems. DeBothezat know-how is the reason for the designed-in efficiency of this split-housing fan — and for the competent assistance you get in *applying* this fan to your specific fume-removal problem. You can specify a DeBothezat Bifurcator . . . install it . . . forget it. It will be right for your job. It needs no attention besides an occasional routine check-up. It runs day in and day out, trouble free.

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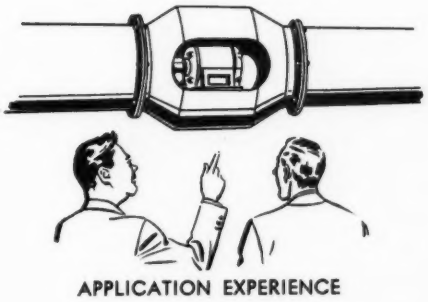

APPLICATION EXPERIENCE

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A DIVISION OF

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☐ Send Bulletin DB-37-55 containing complete data on the Bifurcator for exhausting corrosive fumes.

☐ Have a DeBothezat representative call.

COMPANY

ADDRESS

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ATTENTION MR.

Square Store (suburban department store), Texas. $1,200,000. Client, Sanger Bros. Div. of Federated Dept. Stores.

Forrest and Cotton. Engineering report on water and sewer expansion. $2,000,000. Client, City of Paris, Texas.

Master plant for development of water resources of Trinity River and its tributaries. Client, Trinity River Authority of Texas.

Plans and specifications for water supply reservoir on Murvual Bayou. $1,600,000. Client, Panola County (Texas), Fresh Water District No. 1.

Plans and specifications for dam and reservoir on the Neches River at Blackburn Crossing site. $9,200,000. Client, Upper Neches River Mun. Water Auth.

Blum & Guerrero. Supreme Court Building for State of Texas, Austin, Texas. $4,000,000. Client, State of Texas.

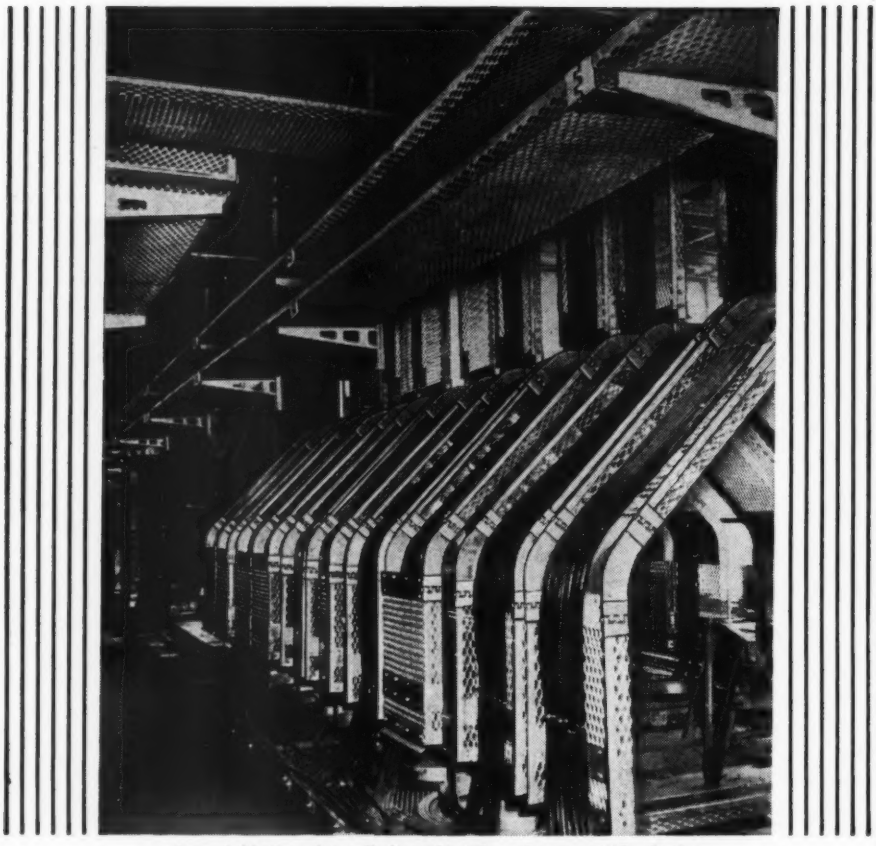
WISCONSIN

Howard, Needles, Tammen & Bergendoff. Milwaukee Expressway System, interchange at Braves Stadium. $8,000,000. Client, State of Wisconsin.

Hitchcock & Estabrook, Inc. Sewage treatment plant. $2,000,000. Client, City of Superior, Wis.

WYOMING

Murray, Riley & Associates, Inc. Cas-



Cope Cable Trough installed at Ohio Edison Company, Niles Station. Hatzel & Buehler, Electrical Contractors.

Many Miles of Cable Supported by COPE TROUGH

Ohio Edison engineers adopted Cope Cable Trough and Rakit supports for many miles of cable in the Niles Station. Utility engineers everywhere are turning to Cable Trough to save costs. The modern Cope design featuring the exclusive pin-type coupling save even more on installation costs.

The Cope 70,000 Series is more flexible than ever before since the new pin-type coupling eliminates the need for many standard fittings, is more readily installed than any other type trough, and fits easily into awkward spaces. Riser elbow for elevation changes.

Armor interlock and other semi-rigid cables are supported by Cope cable ladders. These, too, are readily installed with the pin-type coupler. Simple clamps secure cable to cross members.

Our engineers are ready to work with you. Write us today for full details on new 70,000 Series.

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CABLE SUPPORTING RISER ELBOW

TROUGH WITH BARRIER STRIPS AND COVER

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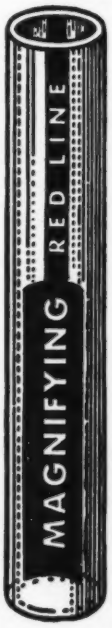

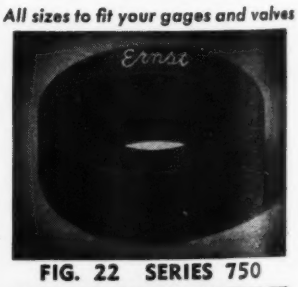

FIG. 22 SERIES 750

FIG. 21 LIP-MOLD

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ERNST WATER COLUMN & GAGE CO.

Livingston 6-1400 LIVINGSTON, N. J.

per National Bank Building, Casper, Wyo. $2,000,000. Client, Robert Wehrli, Architect.

Harold Hoskins & Associates. Water distribution mains. $75,000. Client, City of Shoshomi, Wyo.

FOREIGN

W. H. Hermes, III and Geo. W. Dunn, Associate. Air conditioning and electrical design for new theater in Mexicali, Mexico. Design, specify, purchase all material and equipment and supervise installation. Equipment cost $600,000. Client, Mexican Owner.

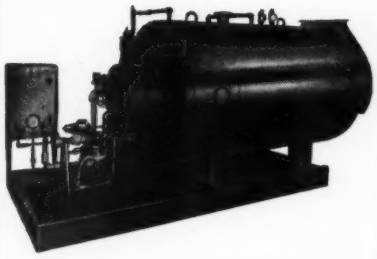
Ballinger-Meserole Co. Initial 700,000 sq ft food warehouse in San Juan. Client, Puerto Rico Department of Commerce.

Harza Engineering Co. Eski Mosul Dam. $45,000,000. Client, Government of Iraq.

Karadj Dam. $40,000,000. Client, Government of Iran.

Centre Falls Dam and power house in Canada. $4,000,000. Client, Great Lakes Power Co., Ltd.

Fred S. Dubin Associates. American Embassy staff housing. Plumbing, heating, electrical. Belgrade, Yugoslavia. $1,000,000. Client, architect, Carl Koch Associates. ▲▲



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Fully Automatic for Gas or Heavy Oil or Combination Oil and Gas.

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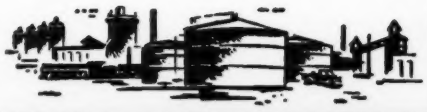


Use SAFETY GRIP-STRUT grating

Wherever a safe footing is required

Grip-Strut circular stairway on Shell Oil tank in Portland, Ore.

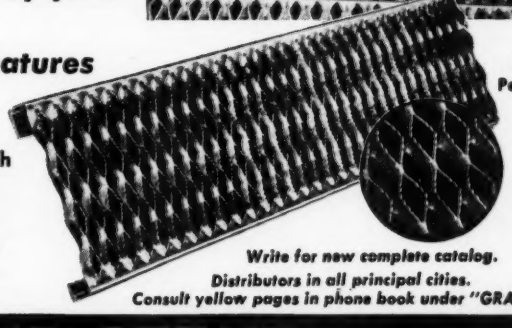
See how Shell Oil uses Grip-Strut for a safe ramp between tanks.

View looking down circular stairway on Shell Oil tank shown above.

SAFETY GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded in steel or aluminum, in standard sizes and gauges. Safety GRIP-STRUT presents an open space, in a diamond pattern, in excess of 55% of the area for ready access of light and air and gives a positive NON-SKID footing in all directions. Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

Important Safety Features

★ Fire proof
★ Slip proof
★ Maximum strength
★ Minimum weight
★ Easy to stand on
★ Cool in summer—warm in winter



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★ ECONOMY
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RIVETED "RETICULINE"

The most substantial grating design made for distribution of heavy loads and rugged needs. Provides maximum traction combined with smoothness for walking, working, wheeling in all directions.

WELDED "GRIPWELD"

Special cross bar effects smoothest, most efficient one-piece welded construction, assuring maximum strength with minimum weight, and safety underfoot.

PRESSURE-LOCKED "X-BAR"

The cross and bearing bars are locked under tremendous hydraulic pressure to provide a strong, safe, lightweight floor. X-Bar Grating is self-cleaning and most economical.

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In riveted and pressure-locked types only. Extra-light, corrosion-resistant, spark-proof. Ideal for chemical and petroleum industries.

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ESTABLISHED 1902

OFFICES and PLANTS at
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Notes FROM ABROAD

Steel for Low Temperatures

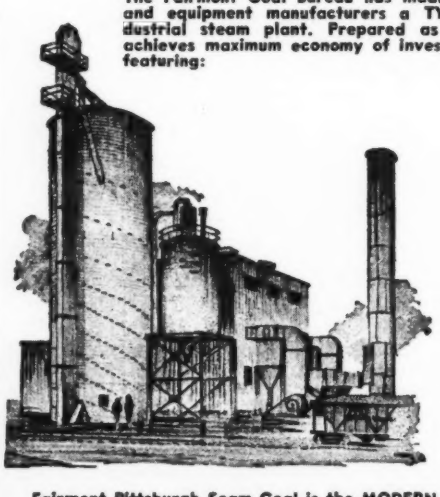
The Swedish Fagersta Steelworks has developed a new type of steel that maintains its ductile qualities at low temperatures. Known as "Colduct," the product is expected to make possible more extensive welded repair work since its ductility gives it high fatigue resistance. Suggested applications are for making of machine parts to be used on machines subject to high vibrations, and in manufacture of small parts through cold pressing.

Photographic Cross Sectioning

During construction of the electric power station at Bardufoss, Norway, engineers used photography for cross sectioning of tunnels. A lamp mounted on a tripod was positioned in the cross section to be measured with its socket

Modern Design *for the*
MODERN COAL

The Fairmont Coal Bureau has made available to consulting engineers and equipment manufacturers a TYPICAL DESIGN for the small industrial steam plant. Prepared as a guide to good engineering it achieves maximum economy of investment and engineering costs, while featuring:



- Fuel flexibility
- High efficiency
- Low fuel costs
- Minimum labor requirements
- Cleanliness, Automaticity, Reliability

Fairmont Pittsburgh Seam Coal is the MODERN COAL. Enormous reserves and inherently favorable mining conditions guarantee ample supply and low production cost. Modern mining and preparation facilities assure uniform quality.

Fairmont Coal Bureau engineers are freely available to help you solve fuel and combustion problems. Write for Technical Reference Bulletins and other valuable publications.

FAIRMONT COAL BUREAU
Dept. CE, 122 East 42nd St., New York 17, N. Y.

parallel to the tunnel axis and fitted with a reflector that yielded an angle of light of 180°. A post painted white over a distance of exactly 2 meters was erected vertically just within the limits of the light/shade plane.

At a distance about five times that of the largest diameter in the profile, a tripod mounted camera was placed. The camera was at approximately the same height as the light so that the optical axis was approximately parallel to the tunnel axis.

After development the negative was placed in an enlarger and projected onto millimeter paper. The enlargement was sized to make the white section of the post stretch over 4 cm on the paper. Contour of the cross section, filled in with pencil, was then 1: 50 on the millimeter paper.

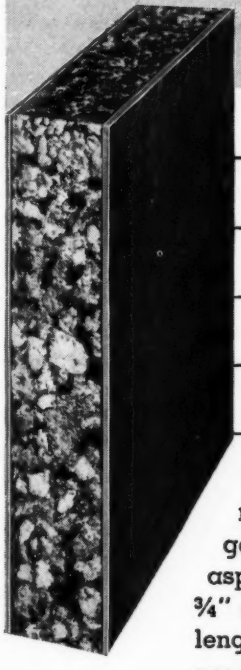
In five hours, two men photographed 30 cross sections. Contour drawings required ½ hr each.

Plasticised Concrete

Asphalt rock, powdered or in chip form, has been added to concrete in tests being run in Italy to find a satisfactory means of plastifying ordinary types of concrete for paving purposes where intense heat and kerosene drips are encountered. Adding bitumen to the concrete mix was inefficient since it was difficult to spread the bitumen evenly. But in asphalt rock bitumen is evenly dispersed.

The addition of powdered asphalt was found to impart a plastic behavior to the compound, although with a reduction of elasticity. As the plastic performance

5 reasons for specifying AND USING SERVICISED® KORK-PAK premolded joint filler



1. Non-extruding
2. Recovers more than 80% of original thickness after compression
3. Low moisture absorption
4. Readily handled without breakage
5. Least expensive non-extruding type

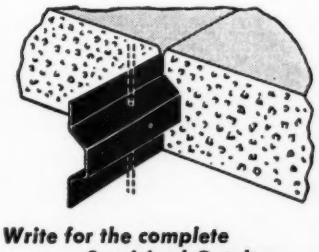
KORK-PAK—an exclusive Servicised development—is composed of cork granules bonded together with asphalt between two sheets of heavy asphalt saturated paper. Available in ¼", ⅜", ½", ¾" and 1" thicknesses, widths to 36", and standard lengths of 5 or 10 feet. Longer lengths supplied on special order.

SERVICISED ASPHALT JOINT FILLER

★ Forms an easily compressible cushion
★ Highly waterproof
★ Low in cost

A composition of asphalt, vegetable fibre and a small percentage of finely divided mineral filler formed between two sheets of asphalt saturated paper which increases strength and rigidity and improves handling. Available in ¼", ⅜", ½", ¾" and 1" thicknesses, widths to 36" and standard lengths of 5 or 10 ft.

TONGUE AND GROOVE JOINT



★ Provides quick, low-cost tongue and groove joint for keyed slab construction
★ Rigid . . . easy to handle and install

Servicised Tongue and Groove Joint consists of a high grade asphalt mastic core formed between sheets of heavy asphalt saturated paper. It is waterproof, non-extruding and extremely durable. Supplied with punching for dowel bars and stake pins. Available without punching. Standard length 10' 2"; widths from 4½" to 10½" in 1" increments; thickness ⅛". Standard widths listed are for slabs from 5" to 11" thick.

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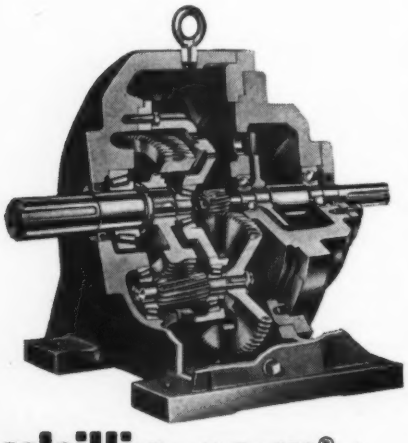
New IN-LINE Speed Reducers...

FLEXIBLE... ECONOMICAL... EFFICIENT

The streamlined compactness of these new units makes them ideal for mounting in places where space is limited. Accurately manufactured helical gearing, rugged housing construction and precision mounted shafts and bearings assure long, dependable service, with a minimum of maintenance. The *new* Phillie Gear "IN-LINE" Reducers are available in 18 different sizes and gear reductions to suit most types of service. Available for mounting in various positions... Standard AGMA ratios from 1.25:1 to 205:1.

Send for illustrated Literature describing these money-saving Speed Reducers.



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Virginia Gear & Machine Corp. • Lynchburg, Va.

increased the mechanical properties diminished, although high values comparable to those of normal concrete are reached. The paving withstood the action of kerosene and its combustion. A coating of only 0.8 to 1 in. thick proved to be sufficient coverage over a good substratum.

Asphalt chips over 0.04 gage in size incorporated in the concrete also gave promising results indicating that it may be possible to produce asphalt chipping-based concrete agglomerates with plastic characteristics almost equivalent to those of asphalt rock and with much higher mechanical resistance properties.

Ruhr Dam

To provide water for Ruhr coal, steel, and chemical industries, the Ruhr State of Northrhine-Westphalia will construct the Biggetalsperre Dam with a capacity of 140 million cubic meters of water. Construction of the dam will require evacuation of 2400 people, six towns, and four factories.

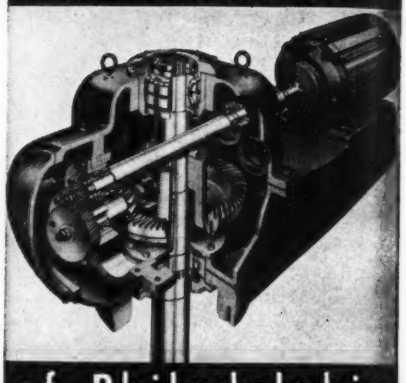
Generator on Line

The first generator at Japan's Sakuma Dam has been put into operation. When the dam is completed, four turbine generators will supply 350,000 kw for the cities of Tokyo and Nagoya. The walled-in Tenryu River will do the work of 1,300,000 tons of coal a year. The dam, seventh largest in the world and the largest in Asia, cost $90 million and took three years to build. More than 6000 Japanese construction men worked under the supervision of engineers from the Guy F. Atkinson Co., of San Francisco, Calif.

All Welded Warehouse

Frame of the new ten-story warehouse planned for Sydney Australia, will be all welded steel, incorporating the beam-to-column joint that permits welding of steel beams directly to the steel column flanges. Lime-ferritic type electrodes will be used for the butt welds. Vermiculite plaster will fireproof the steel beams. P. O. Miller, consulting engineer of Sydney, designed the building with R. V. Minnett & Cullis, of

COMPARE the *Construction*



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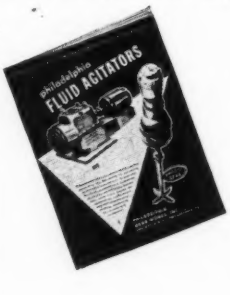

Write for Bulletin A2-55.

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Sydney, as associate architects. Constructors will be H. W. Thompson Pty, Ltd.

Plaster for Fresh Concrete

A Swedish firm has developed a material known as "Spraytek" for spray plastering of fresh concrete surfaces. The material consists of sand, pigments, plaster of Paris, a plaster retarder, water, and a plastic composition as a binder. The mix is prepared in batches of 110 to 220 lb and sprayed from a machine designed by the same manufacturer. Ceilings and walls of an average room can be sprayed in about 5 min and the troweling and smoothing completed in from 30 to 60 min. The finished walls are very resistant to mechanical wear and chemical attacks. The method is economical only where large areas are to be treated and where walls to be plastered are smooth.

Pile Driving

A temporary bridge for pile driving operations on the sea bed has been devised and used successfully as a substitute for conventional floating equipment by the Arpad Gut Contracting Co. at Tel-Aviv, Israel.

Linking the shore and the center of operations, the temporary bridge serves as a transportation artery and as an operating platform to support the pile driving cantilever. It grows longer as work progresses, and then is cut off when the project is completed.

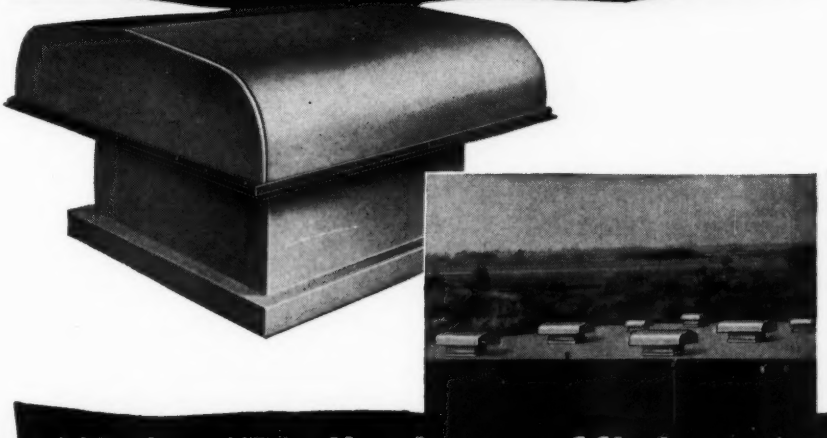
The system allows cheap transportation and work during rough seas. It is being used to lay a 2700-ft, 60-in. steel pipeline that will run out into the Mediterranean, in the suburbs of Tel-Aviv, to discharge the sewage of Greater Tel-Aviv. This is part of a multi-million dollar sewer scheme, being implemented in stages under the supervision of the London consulting firm of G. B. Kershaw & Kaufman.

The pipeline consists of steel sections supported on trestles at intervals of 26 ft, driven 29 ft into soft sandstone. Each trestle consists of four piles made up of 16-in. tubes and two horizontal yokes of two 12-in. channel irons. The outer piles of each trestle are extended temporarily above water level to support a temporary bridge where operations are carried out on firm basis. After all trestles are driven, the pipeline will be floated out, sunk between the trestles, secured, and extensions and bridge will be cut off.

First Power Station Complete

The first of the 17 power stations that are planned as part of the Snowy Mountain Development Scheme has been completed at Guthega, Australia. Now generating 60,000 kw, the station eventually will be extended to provide 90,000 kw. Three more stations are scheduled for completion by 1968. With the Guthega plant, they will produce a total of 1.2 million kw. Dates for completion of the other 13 stations will be decided when detailed investigations, now being carried out, are completed. ▲▲

Low silhouette...



High ventilating efficiency

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Roof Ventilator ties in with modern building trend

Adaptable to many situations where individual roof ventilators serve best, the Low-Line simplifies your selection. For Low-Line is made in both gravity flow and powered types. Roof appearance can be standardized; gravity Low-Lines for use over areas where positive pressure exists — powered style where heat or fumes need forced removal. And where positive intake of fresh air is desired, Low-Line can be arranged for that purpose at our factory. In all three styles the design of this modern ventilator assures top efficiency.

The nicely proportioned hood provides generous capacity — combines neat, business-like appearance with high utility. Made in 11 sizes, with many capacity variations available in powered style. Write for Swartwout Low-Line catalog sections.

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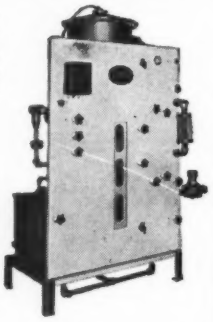
Swartwout ROOF VENTILATORS AND VENTILATING LOUVERS

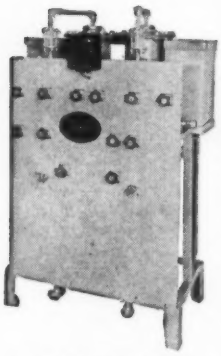
AUTRONIC PROCESS CONTROL EQUIPMENT

ILLCO-WAY
ionXchange

"PACKAGED"
DE-IONIZERS

Right, standardized Model MB Mixed-Bed De-Ionizer available in four sizes for maximum flow rates ranging from 150 to 1000 gals. per hr.





Left, typical Model LU or HB Two-Bed De-Ionizer, each series made in six sizes covering maximum flow rates ranging from 150 to 1000 gals. per hr.

COMPLETELY ASSEMBLED AND TESTED AT FACTORY

If you can determine the capacity and flow rate you need, you can pick out a *ready-made* ILLCO-WAY unit that is all set to be hooked into your lines and go to work. Three series of models are designed to provide different degrees of water purification and different types of treatment, as required by individual situations. All models and sizes have been thoroughly time-tested and have proved highly satisfactory in hundreds of installations.

READY TO OPERATE AS SOON AS CONNECTED

Each one of these "packaged" De-Ionizers is assembled at the factory, the resins put in the tanks, and the completed unit given a working test. Then, without dismantling in any way, it is crated, and is ready for shipment. *For full details and specifications, write . . .*

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DESIGN OF HEATING AND VENTILATING SYSTEMS, by F. W. Hutchinson; The Industrial Press; 320 pp.; $7.00.

Reviewed by Woodrow W. Ramsey, Ramsey and Reeves

The consulting engineer should welcome this book because it will aid him in reducing the time spent on design work. The saving in time is due to the 96 charts that represent the graphical solutions to the respective basic equations on design. By using a chart instead of solving a mathematical equation, the user will be able to arrive at an answer

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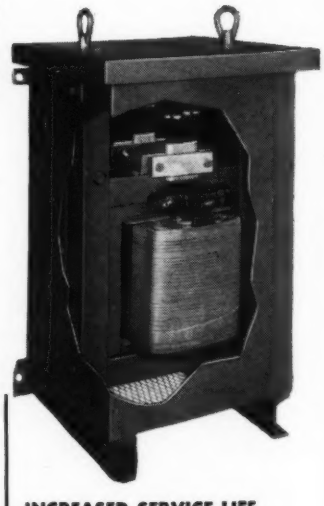

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The core is tightly clamped between steel weldments

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Extra long, heavily-insulated terminal leads are clearly marked for identification

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Coils are wound with double-insulated copper wire with large electrical clearance between coil and core

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sooner with less effort and with less chance of error. These charts could also be used as a rapid check on an engineer's usual method of design procedure. By the inspection of a chart, the relationship of the variables concerned can be visualized, which is a definite advantage to the understanding of the particular phase of the design under immediate consideration.

The page opposite each chart gives the following data:

¶ The equation which the chart represents and text references.
¶ The limitations and conditions on which the chart is based.
¶ A solution of an example by using the chart, followed by a mathematical check.

The theory, preceding the charts, is based on the rational application of engineering knowledge. The user may read the theory section for study or review, or go directly to the charts if he is familiar with the theory.

The book covers the following subjects:

¶ Load determination as per transmission losses; intermittent heating; ventilating and humidification; losses from ducts, pipes, and tubes.
¶ Fuels and combustion.
¶ Air distribution.
¶ Conventional heating system design procedure.
¶ Panel heating design procedure.
¶ Solar heating design procedure.

This last item, solar heating, is of intense interest because it is a phase of design where more workable data is needed.

The section on solar heating of a building due to the solar heat gain of windows in the south wall is fully explained. The charts cover the amount of heat gained per heating season in Btu and the seasonal saving in dollars; amount of overhang for complete irradiation of south-facing windows during the heating season; and the amount of overhang to fully shade south-facing windows during summer (latitudes 30° through 46° inclusive).

The book is a worthy supplement to the regular standard texts on design. May the future bring books of this type on other subjects as well as an extension of the present subject matter.

ALSO AVAILABLE

RLM Specifications Book, 1956 edition, contains important revisions in specifications on both incandescent and fluorescent industrial lighting units, as well as new lighting data of special value to specifiers. The new coefficient of utilization tables for eight different incandescent and fluorescent lighting units are included, along with newly revised light distribution curves on RLM direct and semi-direct fluorescent lighting

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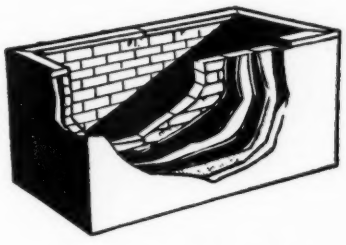

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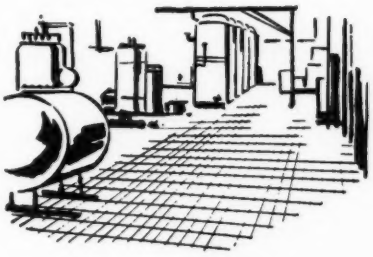

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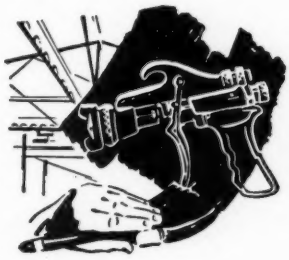

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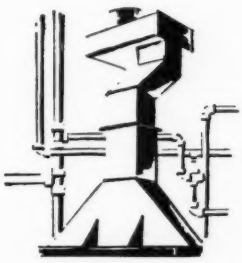

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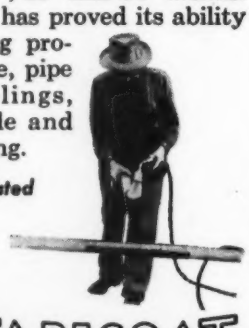

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"Specifications for Metal Lathing and Furring," 1956 Ed., covers all types of metal lath construction and includes specifications for solid and hollow partitions; wall furring; metal lath attached directly to wood supports; contact, furred, and suspended ceilings; beam and column protection for fire-proofing; and reinforcing for exterior stucco. The 16-page booklet is available free of charge from the Metal Lath Manufacturers Association, Engineers Building, Cleveland 14, Ohio.

•

The following literature is available from the Office of Technical Service, U.S. Department of Commerce, Washington 25, D.C.

"The Load-Transmission Test for Flexible Paving and Base Courses," Part IV, Aug. 1955, prepared by Raymond C. Herner, 11 pp., 50 cents, (Report No. PB 111828).

"Technical Digests," Organization for European Economic Co-operation, $24.00 per year, or $2.50 per issue. (The best articles from European technical and industrial journals, translated and digested.)

A Survey of Domestic Electronic Digital Computing Systems, by Martin H. Weik; 271 pp.; $4.75.

"Report of NRL Progress," Naval Research Laboratory's monthly report of non-classified research and development in progress, $1.25 each.

FILMS

"Blueprint for Power," Rigid Steel Conduit and EMT Section of National Electrical Manufacturers Association, sound and color, 20 minutes.

This film demonstrates the advantages derived from the use of rigid steel conduit and EMT in building and renovating programs.

•

"The Choice is Yours," Yeomans Brothers Co., slidefilm, sound, 15 minutes.

Case histories are used to demonstrate applications and construction features of vertical wet pit pumps.

•

"The Tenant at 1010 Main," General Electric Co., 16 mm. sound and color, 32 minutes.

Produced as part of GE's More Power to America program, this film traces the thinking of a building manager whose present building has an inadequate electrical system.

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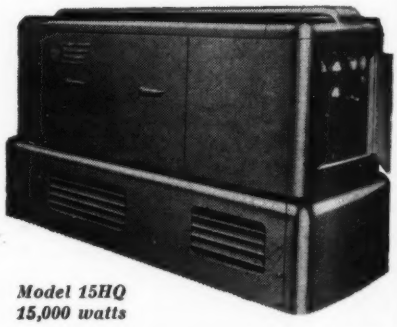

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consulting engineers' calendar

Date	Sponsor	Event	Location
Aug. 21-24	Western Electronic Show and Convention	Show and Convention	Pan Pacific Audit'm. Los Angeles, Calif.
Sept. 5	American Institute of Consulting Engineers	Monthly Meeting	Engineers' Club New York, N.Y.
Sept. 7	Midwest Research Institute	Problems and Opportunities for the Medium-Size City	Linda Hall Library of Science and Tech. Kansas City, Mo.
Sept. 9-12	American Institute of Chemical Engineers	Meeting	Wm. Penn Hotel Pittsburgh, Pa.
Sept. 10-12	American Society of Mechanical Engineers	Fall Meeting	Cosmopolitan Hotel Denver, Colo.
Sept. 16-22	American Society for Testing Materials	2nd Pacific Area National Meeting and Apparatus Exhibit	Hotel Statler Los Angeles, Calif.
Sept. 17-21	Instrument Society of America	11th Annual Instrument-Automation Conference and Exhibit	N. Y. C. Coliseum New York, N.Y.
Sept. 24-28	Atomic Industrial Forum, Inc.	2nd Annual Trade Fair of the Atomic Industry & Meeting	Morrison Hotel Chicago, Ill.
Sept. 25-28	Association of Iron and Steel Engineers	1956 Iron and Steel Exposition and Convention	Cleveland Public Auditorium Cleveland, Ohio
Oct. 1-3	National Electronics Conference	12th Annual Conference	Hotel Sherman Chicago, Ill.
Oct. 9-10	Armour Research Foundation of Illinois Institute of Technology	Conference on Computer Applications	IIT Campus Chicago, Ill.
Oct. 11-12	Armour Research Foundation of Illinois Institute of Technology	National Noise Abatement Symposium	Hotel Sherman Chicago, Ill.
Oct. 18-19	Institute of Management Sciences	3rd Annual International Meeting	Hotel Statler Los Angeles, Calif.
Oct. 18-19	Armour Research Foundation of Illinois Institute of Technology	12th Annual National Conference on Industrial Hydraulics	Hotel Sherman Chicago, Ill.

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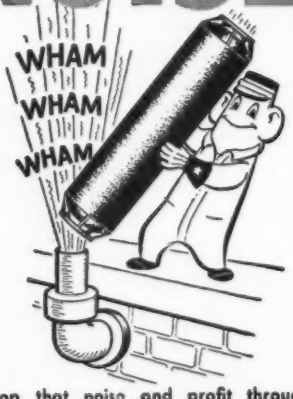

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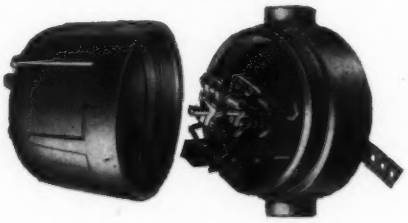

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Air Cleaning & Dust Collection	2	Piping, Valves, & Specialties	9
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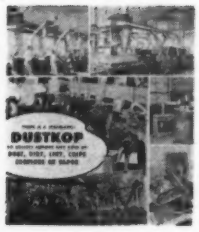
Bring your Technical Reference Files up to Date

Part 2 August 1956

The Consulting Engineer's Professional Magazine

AIR CLEANING AND DUST COLLECTION



1—Dust Collectors

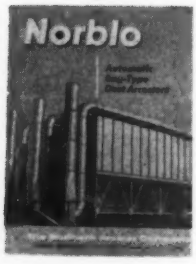
Bulletin 636-B contains illustrations and specifications on the complete Aget line of Dustkop Dust Collectors. It lists applications and tells how to install. It also shows how to figure size and type of equipment needed to solve any dust collection problem. Capacities are 300 to 10,050 cfm for each unit. *Aget Mfg. Co.*

2—Electric Precipitators

"Buell SF Electric Precipitators," bulletin 104, explains and illustrates industrial dust collection by electric precipitation and precipitator design features that result in extra efficiency. It also fully describes simplified construction, exceptional electron emission, and absence of tendency to produce "puffing." *Buell Engineering Co.*

3—Air Filters

"The New Cambridge Aerosolve Air Filter," four-page folder, introduces a high efficiency, low pressure drop system of air filters designed for multi-filter banks in comfort and industrial ventilation or air conditioning supply systems. Filter characteristics, advantages, operation, and application data are given. *Cambridge Filter Corp.*

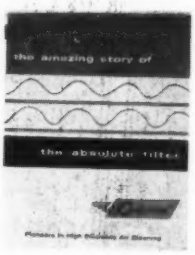


4—Automatic Dust Collectors

How the Norblo automatic bag-type dust collector can provide continuous operation at full capacity is explained in four-page folder 164-5. Dimensions and capacities are listed in tabular form. A flow diagram explains how the unit works. Each part of the collector is shown separately with a description of advantages. *The Northern Blower Co.*

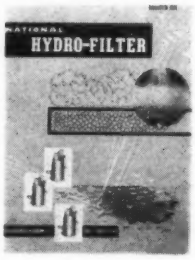
5—Wet Scrubbers

Twelve-page catalog HP 955 describes the new Type A Hydro-Precipitator — a wet scrubber that effectively collects dust under five microns in particle size. In pilot plant tests, the units have attained efficiencies up to 95 percent on dusts, 78 percent of which were under two microns in size. Bulletin lists applications. *Johnson-March Corp.*



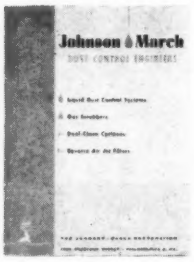
6—Industrial Air Filters

"The Amazing Story of the Absolute Filter," eight-page bulletin 106A, tells about the development of the filter for the Atomic Energy Commission and its subsequent "declassification" for use in industry where critical air cleaning problems exist. Construction, dimensions, applications, and ratings are given. *Cambridge Filter Corp.*



7—Dust Collectors

Outstanding features of the National Hydro-Filter Dust Collector are described in four-page bulletin 556. Ease of operation and maintenance, versatility, cost factors, separating efficiency, controls, and construction and design are discussed. Dimensional data, specifications, and drawings also are provided. *National Dust Collector Corp.*

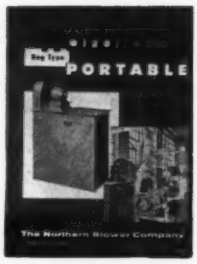


8—Dust Control Equipment

General catalog GC 3755 has been prepared specifically for consulting engineers. It points out the broad range of dust control equipment and engineering services offered by this company. It covers Liquid Dust Control Systems, Gas Scrubbers, Dual-Clone Cyclones, Reverse Air Jet Filters, and other units. *Johnson-March Corp.*

9—Dust Collection Cyclones

Twelve-page bulletin C-103 describes and illustrates Buell Cyclone and manifold design for the scientifically efficient collection or recovery of industrial dusts. Dimensions up to 52 in. in diameter, capacities, and fractional efficiencies are given in tabular and graphic forms. Operation is discussed. *Buell Engineering Co.*



10—Portable Dust Collectors

Small and medium size dust collectors, applicable to single machines or small groups of equipment producing undesirable dust, are described in four-page bulletin 162-6. Capacities range from 300 to 1350 cfm; 5000 fpm velocity in pipes, and 8 in. static pressure at the fan. These include portable and semi-portable sizes. *The Northern Blower Co.*

AIR CONDITIONING, HEATING, AND VENTILATING

11—Air Diffusers

Twelve-page bulletin K-27 introduces the Kno-Draft "Architects' Group" of air diffusers available in two basic types; the Square Diffuser in three models, and the Slotted Diffuser in two models. Typical installations are shown, and tables and selection and performance charts are presented for each model. *Connor Engineering Corp.*

12—Roof Ventilators

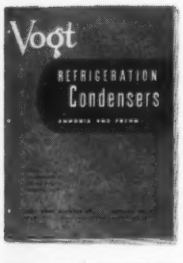
"Penn Airette Ventilators," six-page bulletin PA 14 B, describes direct or V-belt driven exhaust or supply propeller fan roof ventilators. Sketches show low, clean contours of the units. Capacity tables, dimensional charts, and data on mounting bases, construction, and operation are included with specifications. *The Penn Ventilator Co.*

13—Condensate Pump and Receiver

Skidmore Type CVS vertical condensate pump and receiver, in capacities of 500 to 10,000 sq ft E.D.R. and with discharge pressures from 20 to 40 psi, are covered in four-page bulletin 21-B. Engineering data and dimension table are given along with specifications, dimension drawings, and suggested applications. *Skidmore Corp.*

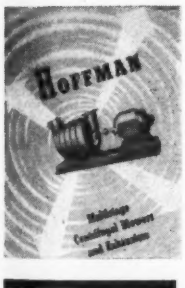
14—Adjustable Louvre

This four-page bulletin presents the Drum Punkah Louvre, which provides directional control, long throw, and high capacity for industrial and commercial applications of heating, ventilating, and air conditioning of large areas. The bulletin gives sizes, performance data, specifications, and a selection guide. *Thermotank, Inc.*



15—Refrigerant Condensers

Engineering data on a complete range of sizes and types of condensers for ammonia and freon refrigerants are given in 40-page bulletin RC-2, "Refrigeration Condensers." Closed, horizontal multipass types, and open, vertical singlepass types are featured. Piping sizes and temperature tables also are included. *Henry Vogt Machine Co., Inc.*



16—Blowers and Exhausters

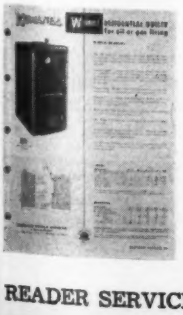
"Hoffman Multistage Centrifugal Blowers and Exhausters," 12-page bulletin M-103, gives information concerning installation, design, construction, operation, and various applications along with charts and graphs on capacity ranges, altitude density tables, conversion factors, friction loss, and performance. *U. S. Hoffman Machinery Corp.*

17—Ready-to-Run Fan Units

Catalog 515-B, 28 pages, presents Clarage V-belt driven Ready Units, complete ventilating sets for handling any volume of air from 100 to 12,000 cfm at low static pressures. Detailed information is given on choosing the correct unit for locations where quietness is essential. Dimensions and specifications are listed. *Clarage Fan Co.*

18—Package Unit Fans

Bulletin FM-315, 24 pages, introduces the new Design 53 Belt-Air package unit propeller fans with capacities of 5000 to 250,000 cfm for industrial and commercial ventilation. Performance data rating tables and charts provide a quick means of determining the number and size of propeller fans best suited for any given application. *Buffalo Forge Co.*

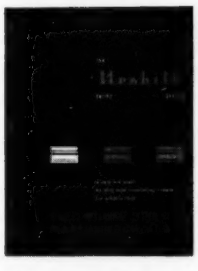


19—Automatic Boilers

The new Kewanee W Series residential boilers are described in these three bulletins — 507, 508, and 509. The boilers are completely automatic for oil and gas firing, 74,000 to 189,000 Btu ratings, forced hot water heating. Ratings, dimensions, and installation drawings are given for each type. *Kewanee Boiler Div. of American-Standard.*

20—Room Conditioners

Eight-page catalog 210-B details the new line of Flow-Temp Remote Room Conditioners for ceiling, wall, or free-standing installations, for heating and cooling, dehumidification, and ventilation. Booklet gives simplified selection procedure, general specifications, dimensions, and capacity tables. *Acme Industries, Inc.*

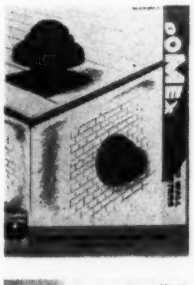


21—Classroom Heating

Eight-page booklet 104 describes the important features of the Nesbitt Series Wind-O-Line System — a forced hot water heating and ventilating system for schools that eliminates need for pipe trenches, coverings, and runouts, and reduces size of pipes and pumps with a saving in over-all costs of up to 20 percent. *John J. Nesbitt, Inc.*

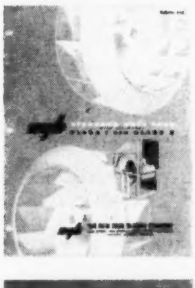
22—Air Jets

Typical installation photographs in eight-page bulletin DH-42-56 show the "HY-V" Air Jets in use for cooling equipment, products, building space, and workers. Construction details, certified capacities, and dimensions are given for units with diameters 18 to 30 in. *DeBothezat Fans Div., American Machine and Metals, Inc.*



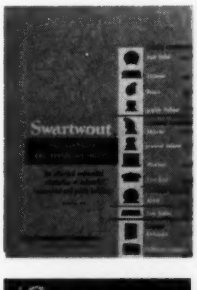
23—Roof and Wall Exhausters

"Penn Domex Roof and Wall Exhausters," six-page bulletin DMX-18, describes durability of aluminum spun into weatherproof housing for centrifugal fans for modern buildings. Capacity tables, dimensional charts, and details of new Sonotrol Curb for reducing sound build-up at source are given. *The Penn Ventilator Co.*



24—Power Limiting Fans

Complete engineering information for specifying standard duty power limiting fans, Classes I and II, is contained in 52-page bulletin 561. It describes available arrangements and explains proper application, gives tables of material specifications, and size charts showing the zone of best selection. *New York Blower Co.*

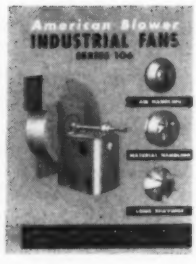


25—Ventilators

Louvers and gravity, powered, and centrifugal ventilators for industrial, commercial, and public buildings are described in 12-page condensed catalog 351. Dimensional drawings, installation data, dimensions and weights, operating methods, and cutaways are given for the various types available. *The Swartwout Co.*

26—Fan Capacity Regulation

Vortex Control, a device consisting of a number of movable blades located in a fan inlet for regulation of air capacity and pressure with fan operating at constant speed, is described in eight-page bulletin 122-A. It explains application of control to air conditioning fans, unit stoker fans, and other equipment. *Clarage Fan Co.*



27—Industrial Fans

Bulletin 5306, 72 pages, describes the new Series 106 Industrial Fan that provides full-range coverage of industrial air and material handling requirements. Included are an elevated temperature application guide, rating table, and selection tables based on constant pressure method and cold static method. *American Blower Corp.*

28—Pump-Receiver Units

The Skidmore Type VC single unit condensation pump and receiver is described in four-page folder 10-B. Quiet operation, low inlet connection, cast iron construction, and accessibility without disturbing piping are pointed out. Dimensional drawings and engineering data and dimension tables are given. *Skidmore Corp.*

29—Gravity Roof Ventilators

The Swartwout Contouramic Airmover, a new extra-low roof ventilator of the extended heat valve type, is described in four-page bulletin 312. Application information, capacity, dimensions, and weights are included along with data on drainage, air flow, damper operation, and installation detail drawings. *The Swartwout Co.*

30—High Pressure Air Systems

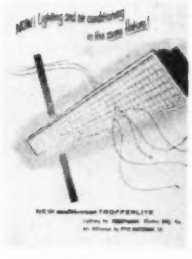
Bulletin K33, 48 pages, makes available to the engineer comprehensive information on the use of high pressure air transmission systems—when and where they should be used, gives typical layouts, detailed data for design of such a system, data on sound levels, temperature differentials, and air distribution. *Connor Engineering Corp.*

31—General Purpose Fans

Portable, self-contained general purpose fans of medium capacities for ventilating and industrial applications are covered in 12-page bulletin 545. Condensed capacity tables, fan dimensions, fan discharge views, and lists of material specifications are given, along with suggested applications for each type of unit. *New York Blower Co.*

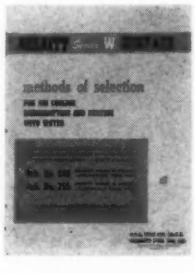
32—Propeller Fans

Features of the NV-Breezo propeller fan, designed for quiet and efficient ventilation of commercial and industrial business places, is described in 12-page bulletin FM-115. Decibel ratings and performance ratings are given, along with suggestions for fan selection and installation, and a table of air changes. *Buffalo Forge Co.*



33—Air Diffusion-Lighting Unit

"Now! Lighting and Air Conditioning in the Same Fixture!" eight-page bulletin, presents the new Multi-Vent Troffer-lite for use with any type of drop ceiling. With lighting by Benjamin Electric Mfg. Co. and air diffusion by Pyle-National, the units are recommended for installation in new or older buildings. *The Pyle-National Co.*



34—Heating and Cooling

"Methods of Selection," publication 256, 36 pages, provides complete data and procedures necessary to the selection of Nesbitt Series "W" Surface for air cooling, dehumidifying, or heating applications using water as a cooling or heating medium. It contains graphs, tables, specifications, and examples of selection. *John J. Nesbitt, Inc.*

35—Unit Heaters

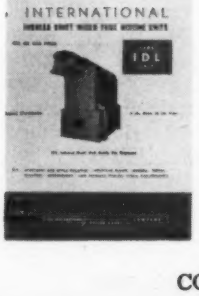
Bulletin B-1730, 20 pages, gives details, capacities, application, and selection data on the new 34 model line of Webster Little Giant Unit Heaters for interchangeable use with steam or hot water. Bulletin B-1720 gives similar data on the Propeller Fan Unit Heater in 24 models from 15,000 to 335,000 Btu per hr. *Warren Webster & Co.*

36—School Heating

Before specifying boilers for modern school buildings or for modernizing existing buildings, you will want to read over the check list of what to look for in a boiler for these applications as presented in four-page folder 512. Installation photographs show fully automatic package steam generators for oil or gas. *Johnston Brothers, Inc.*

37—Bifurcators

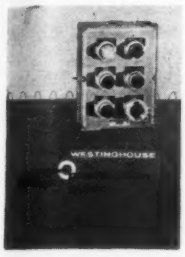
Definitions and fan laws, how to figure performance at non-standard conditions, how to find system resistance, and pressure and friction charts are included in 16-page bulletin DB-37-55 on the DeBothezat bifurcators for ventilation, heat, and fume exhaust. Dimensions are given. *DeBothezat Fans Div., American Machine and Metals, Inc.*



38—Water Tube Heating Units

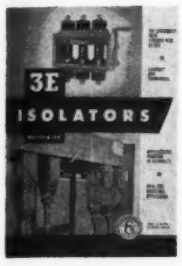
Bulletin 500, six pages, covers the Type IDL induced draft water tube heating units, oil or gas fired, rated at 15 psi steam, 30 psi water. Complete specifications, dimensions, and dimensional drawings are given. Units are shipped ready for installation of insulation and refractory, and burner and controls. *International Boiler Works Co.*

ELECTRICAL EQUIPMENT



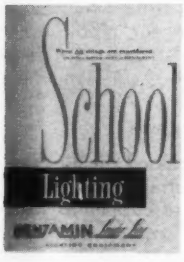
39—Pushbutton Guide

Bulletin B-6749 is a complete 76-page guide containing illustrations, application data, dimensions, and prices of a complete line of Industrial Pushbuttons. Whether the application calls for standard duty, heavy duty, Oil-tite, or special service control stations, this easy-to-read catalog will give the answer. *Westinghouse Electric Corp.*



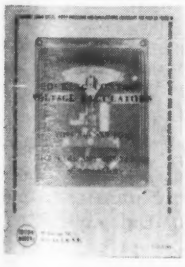
40—Disconnectors

Bulletin 140, 36 pages, describes 3E ISOLATORS for disconnecting equipment and cables, in ratings up to 15,000 v and 1200 amp. It lists points to be considered when ordering, shows the units in typical applications, and gives dimensional drawings, cutaways, and specifications for the various types. *Electrical Engineers Equipment Co.*



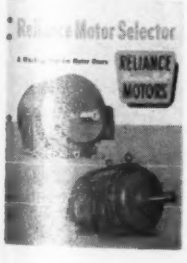
41—School Lighting

"School Lighting," four-page folder AD 6549, lists the factors to consider when selecting lighting units for schools. These include: light levels, visual comfort, vertical surfaces, corridors with lockers, environmental lighting, and maintenance factor. Lighting fixtures for various uses are illustrated. *Benjamin Electric Mfg. Co.*



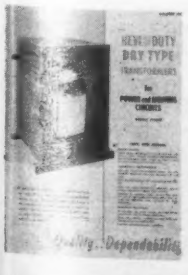
42—Voltage Regulators

Types JS1/1 and JSG1/1 rocking contact voltage regulators for small and medium-sized a-c generators are described in 14-page bulletin P 08-3090. Connection diagram, outline and mounting drawing, and application chart are given. The booklet is indexed for easy reference and carries complete specifications. *Brown Boveri Corp.*



43—Motor Selector

"Reliance Motor Selector," 12-page bulletin B2103, is a working tool for engineers specifying a-c motors, for general or special services. It lists speed-frequency relationship, explains design classes, lists current and torque values and frame sizes, and gives suggested applications for each motor type. *Reliance Electric and Engineering Co.*

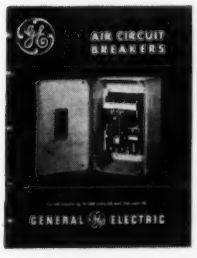


44—Transformers

Bulletin 100, four pages, contains in table form statistical information on capacities, prices, approximate dimensions, temperature rise, and weights of the entire line of single phase power and lighting transformers made by Hevi-Duty. Dimensional drawings and photos are given for each type of unit. *Hevi-Duty Electric Co.*

45—Weather-Protected Motors

Bulletin PB 1400-6 describes details of the weather-protected motor. It illustrates how the enclosure—without additional protection—positively excludes moisture and dirt from the windings under the most severe outdoor service. Ventilation, possible modifications, and construction features are discussed. *Elliott Co.*

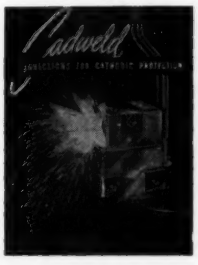


46—Air Circuit Breakers

Bulletin GEA-5915, 16 pages, describes the AK line of magnetic air circuit breakers for low-voltage (600 v and below) applications. It includes application information for applying breakers individually or in selective or cascade systems. Dimensions and specifications cover indoor and outdoor use. *General Electric Co.*

47—Transformers and Substations

Twelve-page bulletin 655 describes construction and advantages of the Sorgel Load Center dry-type and Askarel-cooled transformers — units that can be installed in buildings without fireproof vaults. Substations embodying these transformers and supplied with various types of primary and secondary switchgear are discussed. *Sorgel Electric Co.*



48—Cathodic Protection

Cadweld connections for cathodic protection are described in four-page folder 549-2. Included are specification tables, drawings, and directions for ordering and installation of formed terminal connections and anode lead connections. How copper is welded to either copper or steel without heat is explained. *Erico Products, Inc.*

49—Cable and Tube Raceways

The Globetray system of cable and tube raceways engineered for uniform design and easy installation is described in this 12-page bulletin. Aluminum and steel load data are given along with illustrations of expanded metal, solid bottom, and standard types of Globetray raceways. Installation photos are included. *Globe Co.*

50—Low Voltage Switchgear

Bulletin 6004-B, 12 pages, describes I-T-E low voltage metal-enclosed drawout switchgear, indoor and outdoor, incorporating type K and LG circuit breakers. Ratings are through 600 v, 6000 amp continuous, and 150,000 amp interrupting. Also included are basic standard arrangements. *I-T-E Circuit Breaker Co., Switchgear Div.*

51—Gear Motors

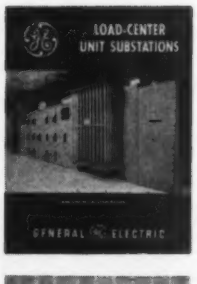
Bulletin GM-560, 44 pages, is a complete, illustrated manual covering the design and selection of GearMotoRs, Utility GearMotoRs, In-Line Reducers, and Right Angle Motorized Worm Reducers. It lists standard unit specifications to facilitate application and briefly summarizes plant manufacturing facilities. *Philadelphia Gear Works, Inc.*

52—Corrosion-Proof Motors

"From Naphtha to Grain Dust," eight-page booklet B-2402, gives complete information on the design characteristics of the new Corrosion-Proof A-C Motor with examples of its many applications to industries with corrosive conditions inherent in processing or production. Exploded view shows construction. *Reliance Electric & Engineering Co.*

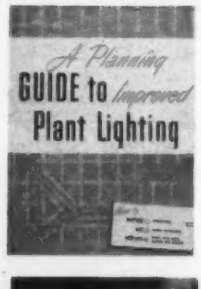
53—Products Guide

This 16-page bulletin contains descriptive data on major products manufactured by I-T-E, such as: power switching equipment, metal-enclosed bus, metal-clad and low voltage metal-enclosed switchgear, unit substations, air circuit breakers, network analyzers, mechanical rectifiers, and porcelain insulators. *I-T-E Circuit Breaker Co.*



54—Load-Center Distribution

Bulletin GEA-3592, 32 pages, describes advantages of using load-center distribution and compares various load-center systems. It includes complete descriptions of incoming-line equipment, transformers, and low-voltage switchgear. Tables give ratings, weights, dimensions, and application information. *General Electric Co.*



55—Plant Lighting

"A Planning Guide to Improved Plant Lighting," 30-page bulletin AD 5573, explains the economics of a planned program in terms of cutting production costs for your client. It gives the factors involved in selection of proper lighting equipment, and recommends levels of illumination for industrial operations. *Benjamin Electric Mfg. Co.*

56—Fused Starters

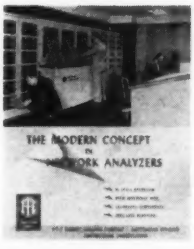
"For industrial high-voltage systems a 'ten times starter' is not enough," according to 12-page booklet B-6535. It tells how high-voltage, fused starters give protection to the system, personnel, and motors. Horsepower ratings and representative types of starters available for a-c motors are listed. *Westinghouse Electric Corp.*

57—Large Two-Pole Motors

A review of significant design developments that have resulted in today's large two-pole induction motors is given in bulletin PB 7000-4. It illustrates and describes the "super-quiet" design that solves one of industry's most serious noise problems—the traditionally noisy large two-pole induction motor. *Elliott Co.*

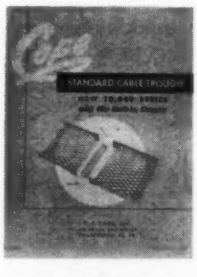
58—Dry-Type Transformers

"Latest Development in Dry-Type Transformers," eight-page bulletin 155, gives typical applications, sizes and types, construction, and specifications for air-cooled, dry-type transformers, both standard and custom-built. Photos and short descriptions are included for many of the types of transformers and accessories. *Sorgel Electric Co.*



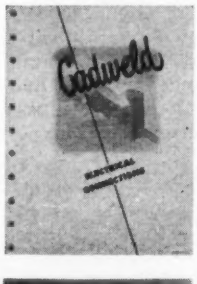
59—Network Analyzers

"The Modern Concept in Network Analyzers," eight-page bulletin 4004-A, incorporates descriptive and operating information on I-T-E network analyzers, suited to handle such power system problems as load flow, short-circuits, and transient or steady-state stability. Rental is discussed. *I-T-E Circuit Breaker Co., Switchgear Div.*



60—Cable Trough

Sixteen-page bulletin 67A gives full details on the new 70,000 Series prefabricated, expanded metal trough with built-in coupler for supporting power cable in less space and at less cost than conduit. Tracing templates are reproduced to exact scale for your convenience in detailing the most widely used Cope trough items. *T. J. Cope, Inc.*

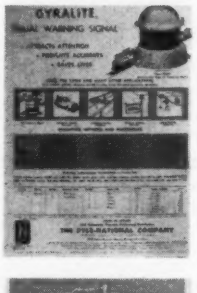


61—Electrical Connections

Cadweld process described in 76-page electrical connection catalog is a method of welding copper to copper or steel without an outside source of heat. Equipment to form many types of electrical connections is described. Types of connections include cable, ground rod, horizontal and vertical surface, rail bonds, and studs. *Erico Products, Inc.*

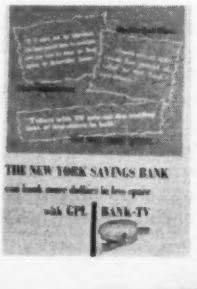
62—Bus Duct Manual

"Bus Duct Manual," 72-page bulletin B-4272B, is designed for consultants' use in planning and selection of units for bus duct layout in commercial, institutional, and industrial buildings. Plug-in duct, weather-proof feeder duct, low-impedance duct, and weather-proof low-impedance duct are fully covered. *Westinghouse Electric Corp.*



63—Warning Light

The Gyralite visual warning signal for marking exposed work areas, school crossing protection, and train and vehicle warning is described in this folder. Dimensions, types of control, mounting methods, and accessories are given. The unit has a revolving dual beam that provides 96 flashes per minute. *The Pyle-National Co.*



64—Bank TV Equipment

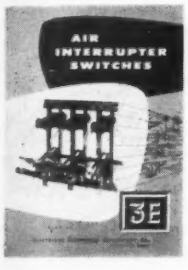
This four-page booklet describes how GPL closed-circuit television at the New York Savings Bank speeds customer service, cuts operating costs, and enables bank to handle more business in less space. Pictures illustrate the installation and the required equipment and explain system operating details. *General Precision Laboratory, Inc.*

65—Rugged TV Camera

A new "ruggedized" television camera, Model PD-152, is illustrated and described in specification sheet PD-152, which includes environmental capabilities and performance characteristics. Use for rocket and jet test stands, wind tunnels, and automotive, research, manufacturing, and the military is shown. *General Precision Laboratory, Inc.*

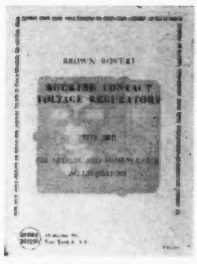
66—Panelboard Planning

What your clients have a right to expect in the panelboards you specify—and how to be sure they get it — is explained in 16-page bulletin B-6098 "Panelboard Planning." Applications, what panel to select, and the difference in panelboards from the standpoint of user and contractor advantages are covered. *Westinghouse Electric Corp.*



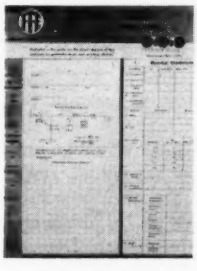
67—Air Interrupter Switches

Bulletin 152 lists and illustrates a complete line of indoor Air Interrupter Switches through 14.4 kv. Units offer Auto-Speed interruption and automatically produced interruption that occur at the same point in the switching operation and take ½ cycle. Ratings, dimensions, and specifications are given. *Electrical Engineers Equipment Co.*



68—Generator Voltage Control

Rocking contact voltage regulators, Type JB1/1, for medium and medium-large a-c generators are described in 12-page booklet P 08-3095. Specifications and special features, theory of operation, sensitivity, application, parallel operation, and, compounding are discussed and outline and mounting diagrams given. *Brown Boveri Corp.*



69—Planning Guide

Eight-page bulletin 10004-B gives complete information on how to plan and specify isolated phase bus for generator leads and switching stations. It contains the latest data on the new telescoping cover construction. This is a companion bulletin to comprehensive 28-page bulletin 1000-A on metal-enclosed bus. *I-T-E Circuit Breaker Co.*

For your personal copies of these bulletins, please fill out the card between pages 4 and 5 or 20 and 21.

ENGINEER'S OFFICE EQUIPMENT

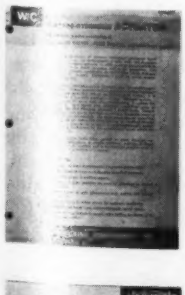
70—Drafting Set

This pocket-size folder introduces the new Desk-Topper, a drafting and layout machine complete with board, that provides a portable drafting room for you, wherever you go. As described in the bulletin, the kit includes self-aligning scales, folding board, adjustable mount, full size protractor, and carrying case. *Universal Drafting Machine Corp.*

71—Drafting Set

"Here's the Gift of the Year," six-page folder, suggests the new Universal Desk-Topper as a gift for business acquaintances and friends. This is a complete drafting system incorporating the Boardmaster drafting machine, folding drawing board, 9 and 12 in. scales, and carrying carton or optional luggage case. *Universal Drafting Machine Corp.*

INSTRUMENTS AND CONTROLS

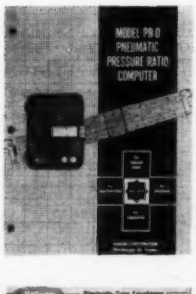


72—Actuator

Bulletin 22 describes a positional control for actuation of butterfly valves, control valves, and dampers. The actuator utilizes the electrical input signal from standard controllers and has linear stroke to 100,000 ft lb, full stroke in 1 sec, frequency response flat to 5 cps. Complete specifications are given. *Weighing Components, Inc.*

73—High Pressure Gages

The new Yarway Color-Port Water Gage for boiler pressures to 3300 psi is completely described in six-page bulletin WG-1814 (56). The bulletin shows typical mirror hook-ups for bringing gage picture to convenient eye level. Port cover plates that minimize maintenance problems are described also. *Yarnall-Waring Co.*



74—Computers

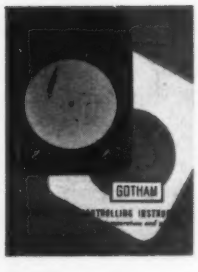
Four-page bulletin MSP-103B describes the Model PR-O Pneumatic Pressure-Ratio Computor which measures compressor inlet and outlet pressures and simultaneously calculates their ratio, indicates ratio, and generates signal. Other models perform square root extraction, squaring, and multiplying operations. *Hagan Corp.*

75—Liquid Level Controls

A series of four Levalarms, liquid level alarms and fuel cut-outs, is described in four-page bulletin D2. The bulletin explains principle of operation — water conduction between electrodes of varying lengths — how the units can be used with relays to provide alarm actuation, fuel cut-out, or pump start-stop control. *The Reliance Gauge Column Co.*

76—Automatic Controls

An enormous volume of valuable material, well illustrated, is to be found in the large, 52-page catalog No. 856, "Mercoid Automatic Controls for Domestic and Industrial Applications." All types of controls manufactured by this company are described in detail so that the right specifications can be written to fit the job. *The Mercoid Corp.*



77—Recorders and Controllers

Catalog 456, 20 pages, covers the complete new line of recorders and indicating and recording controllers made by United States Gauge. Electric and pneumatic controls are described along with drives, accessories, and pressure elements. Available chart calibrations included. *Gotham Instruments, Div. of American Machine and Metals, Inc.*

78—Remote Reading Gages

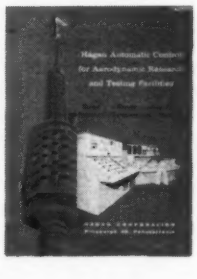
"You Can Check the Liquid Level From Anywhere in the Room," eight-page bulletin 246, covers the three standard types of Convex Scale and Flat Scale Truscale Remote Reading Gages, showing how they afford protection for valuable equipment and thus prevent expensive and time consuming shutdowns. *Jerguson Gage & Valve Co.*

79—Pressure Gages

The new line of United States Gauge pressure gages of the Supergauge and Solfrunt (solid cast front) types in sizes 4½, 6 and 8½ in. are described in 12-page bulletin 1819. Dial selection chart and text provide quick spot-checking for types, materials, and accessories. *United States Gauge, Div. of American Machine and Metals, Inc.*

80—Columns and Gages

Water columns, gages, and equipment for pressures from 250 to 2500 psi are each briefly described in four-page catalog 500, Sec. BO. Cutaway views explain operation, construction, and advantages of each item. Equipment is also shown for replacement and modernization of existing boiler installations. *The Reliance Gauge Column Co.*



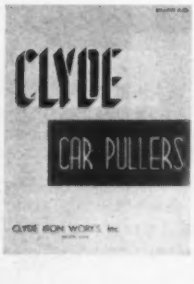
81—Testing Equipment

"Hagan Automatic Control for Aerodynamic Research and Testing Facilities," 20-page bulletin MSP-133, describes a line of high-speed, high-powered precision electrical and electronic automatic control components for all standard variables — surge, altitude, mass flow, pressure, temperature, and position. *Hagan Corp.*

MATERIALS HANDLING AND STORAGE

82—Weighing Scales

"W/C Pneumatic Weighing Scale," four-page folder 10, describes a new platform weighing scale adaptable for batch or continuous process control, with scale indication errors never greater than 0.25 percent of range. Bulletin covers outstanding features, typical applications, accessories, capacities, and sizes. *Weighing Components, Inc.*

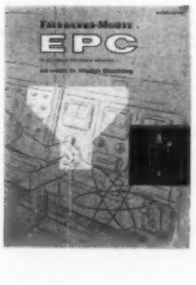


83—Car Pullers

Ten-page bulletin L-6 shows capstan type car pullers for moving cars a short distance using manila rope. Three styles of drum car pullers for heavy duty car moving, shuttle work, or for servicing very large areas are also listed, as well as barge movers for shifting barges back and forth during unloading. *Clyde Iron Works, Inc.*

84—Storage Bins

If you specify vertical storage construction for handling flowable bulk materials, this ten-page foldout will help you visualize how this company's Super-Concrete Stave Storage Bins might meet your requirements. The booklet contains photographs of typical installations, lists uses, and explains construction. *The Neff & Fry Co.*

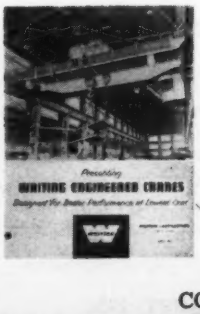


85—Electronic Weigh Batching

The EPC (Electronic Program Control), a system that automatically selects proper supply bins, weighs out quantity called for by formula, and controls material flow to succeeding operations, is described in eight-page bulletin ED-15. Setting up formula on cards, and operation of the EPC, are covered. *Fairbanks, Morse & Co.*

86—Automatic Feeders

Bulletin 253, 16 pages, discusses the application of the Merrick Model WS Feedoweight — a self-contained automatic, continuous gravimetric feeder for blending, proportioning, or feeding of granular materials to process by weight. Specifications, drawings, and capacities are given for left and right-hand assembly. *Merrick Scale Mfg. Co.*



87—Cranes

Twelve-page catalog 80 explains how your client gets low cost handling with Whiting engineered cranes. Such features as Selectodyne control, full vision cab, and Timken tapered roller bearings are described. Photos show the cranes in use in foundry yards, in steel mills, in diesel repair shop, and in power plants. *Whiting Corp.*

88—Conveyor Scales

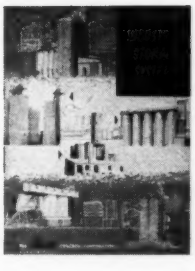
"Weight at a Glance," 22-page bulletin 375, contains complete specifications, drawings, and illustrations of the Merrick Model E Weightometer — a fully automatic conveyor scale for continuous weighing of material passing over an existing belt conveyor. Other types of automatic weighing machines are described. *Merrick Scale Mfg. Co.*

89—Steel Derricks

Advantages gained by using Whirlettes — full revolving, self contained steel derricks — are listed in four-page folder MP-49. The hoist is mounted on the rotating structure and only one foundation is necessary. No guy lines or stiff legs are required. Booklet gives specifications, and illustrates typical uses. *Clyde Iron Works, Inc.*

90—Overhead Handling Systems

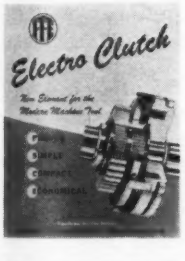
Trambeam, an overhead handling system available in either monorail or crane systems and designed to handle loads up to 15 tons, is described in 20-page bulletin M-20. Motor-driven, electric hoist, and cab-operated carriers are shown. Special features such as the flexible suspension are discussed and pictured. *Whiting Corp.*



91—Industrial Storage Silos

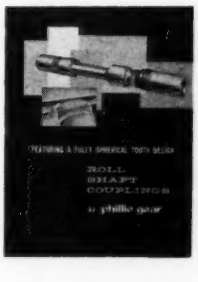
"Modern Industrial Storage Systems." 12-page brochure 4393, discusses the subject of storage for raw ingredients, semi-processed, or finished material. The flexibility and adaptability of concrete silos is discussed. Descriptions of component parts and construction are supplemented with line drawings. *The Marietta Concrete Corp.*

MECHANICAL POWER TRANSMISSION



92—Clutches

The Electro Clutch, developed to connect or disconnect a driven shaft or gear from a driving shaft that is either running or standing still, is described in four-page bulletin ECP-656. Photos show the units in typical applications where many output speeds are desired. *I-T-E Circuit Breaker Co., Transformer-Rectifier Div.*

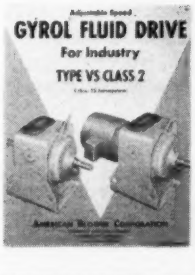


95—Couplings

Application of the Phillie Gear Roll Shaft Coupling in the metal processing industry is discussed in this four-page bulletin. It describes such features as a spherical tooth design that allows minimum backlash, higher tooth loadings, and reduced clearance between teeth. Dimensions and ratings are listed also. *Philadelphia Gear Works, Inc.*

93—Right Angle Gear Drives

Right angle solid shaft gear drives for centrifugal pumps and industrial use — cooling tower installations, barge service, sewage disposal, fire and flood control — manufactured in a wide range of models to meet specific requirements, are described and illustrated with engineering details in eight-page catalog 28. *Johnson Gear & Mfg. Co.*



96—Fluid Drives

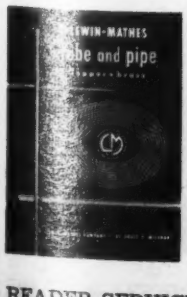
Eight-page bulletin 9819 describes the new 1 through 25 hp Type VS Class 2 Gyrol Fluid Drives. It discusses advantages and typical applications of this adjustable speed fluid drive and gives design and general construction features. Selection tables, cutaway drawing, and installation drawings are given. *American Blower Corp.*

94—Flexible Gear Couplings

Advantages and typical applications of flexible gear couplings are pictured and described in 16-page catalog C-4, "The Revolutionary New Sier-Bath Flexible Gear Couplings." Couplings are available in standard, vertical, mill-motor, floating shaft and spacer type, and in many special purpose types. *Sier-Bath Gear & Pump Co., Inc.*

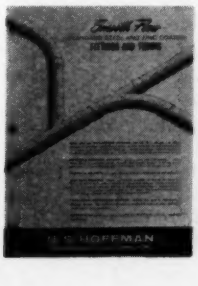
For your personal copies of these bulletins, please fill out the card between pages 4 and 5 or 20 and 21.

PIPING, VALVES, AND SPECIALTIES



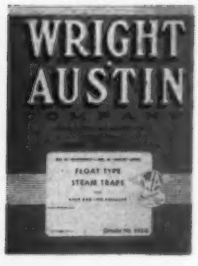
97—Tubing and Piping

This 12-page bulletin lists each type of Lewin-Mathes copper and brass tubing and piping with the temper, lengths, fittings, uses, and specifications. Sizes and capacities are in table form to aid in selection. Photos show use for water piping, air conditioning, heating, underground service and drainage lines. *Lewin-Mathes Co.*



98—Fittings and Tubing

"Smooth Flow Fittings and Tubing," four-page bulletin SF-155, describes in detail these new fittings and tubing available in either standard steel or zinc impregnated stock. It discusses assembly, installation, and types of fittings and tubing for various applications. Photos and schematics are included. *U.S. Hoffman Machinery Corp.*

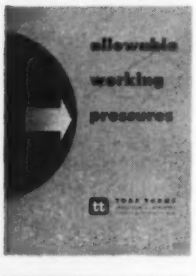


99—Steam Traps

Float type steam traps for high and low pressures are shown in four-page circular 615-B. Two types are covered: the Series 30 "Emergency" 3-valve steam trap for 0 to 200 psig; and "Victor" Series 40 low pressure trap for heavy duty service, 0 to 20 psig. Capacities, weights, and dimensions are given. *Wright-Austin Co.*

100—Gate Valves

Bulletin 1007, four pages, describes and illustrates the versatility of the OIC Duo-Bolt Gate Line Valves in the IBBM and all iron series. The IBBM series features bronze seat rings that are cast and rolled into position. The all iron series features nickel plated steel stems and rugged resistant type body bonnet. *The Ohio Injector Co.*



101—Working Pressures

"Allowable Working Pressures," 28-page bulletin TT 640, contains combination tables based on ASME Boiler Construction Code, 1952 Ed., and American Standard Code for Pressure Piping, ASA B 31.1 - 1955. Range of types and sizes of Tube Turn welding fittings and forged steel flanges are also given in table form. *Tube Turns, Inc.*

102—Wrought Iron Pipe

"Wrought Iron Pipe for Modern Building," 14-page bulletin, presents examples of the use of wrought iron pipe for building piping, radiant heating, and snow melting. Resistance to corrosion and to fatigue stresses, weldability, forming and threading, protective coatings, availability, and cost are discussed. *A. M. Byers Co.*

103—Valves

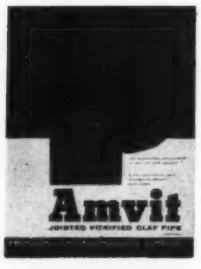
Twenty-page catalog V-55 covers magnetic and motorized valves for air, water, gas, steam, oil and refrigerants. It includes specifications, sizes, capacities, and suggested applications for each type of valve, flow charts for liquids and compressible fluids, tables of dimensions, and other engineering data. *The Mercoid Corp.*

104—Underground Pipe Insulation

"Gilsulate . . . The Triple-Zone Insulation," four-page bulletin, gives tips on the uses and installation of the new insulation for hot underground pipes. It explains how the material protects pipes against corrosion caused by acid and alkaline ground waters, and against bacterial action, roots, and electrolysis. *American Gilsonite Co.*

105—Instrument Tubing Trough

Twelve-page bulletin 255 describes the Instrof system, a new standardized trough design, for the support of instrument tubing. Wide range of fittings that makes possible rapid assembly at the job site are shown, with special attention given to the built-in coupler. Booklet points out advantages of continuous support. *T. J. Cope, Inc.*

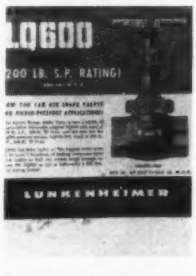


106—Jointed Clay Pipe

Jointed vitrified clay pipe known as Amvit, with a built-in mechanical joint made from polyvinyl chloride is described in four-page folder. Advantages such as infiltration prevention, quick installation, immediate backfilling, better flow, shock absorption, and quick testing in the field are pointed out. *American Vitrified Products Co.*

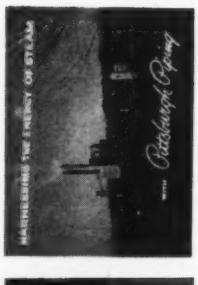
107—Valves

"It's easier to open or close a Golden-Anderson valve than to drive a car with power steering," eight-page bulletin G-4, explains why the G-A Cushioned Automatic Valves are so easy to operate and covers other design features. A brief description of eleven other types of valves in sizes 2 to 36 in. is given. *Golden-Anderson Valve Specialty Co.*



108—Bronze Globe Valves

This circular on the Fig. LQ600-200 Globe Valve points out that Lunkenheimer LQ600 valves are now available in a new line for higher pressure service, rated at 200 lb S.P., 400 lb W.O.G. It gives the dimensions of the eight sizes, from ¼ through 2 in. in diameter, and describes design features and construction. *Lunkenheimer Co.*



109—Power and Process Piping

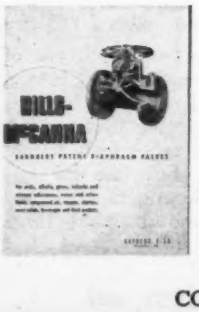
"Harnessing the Energy of Steam" describes research, metallurgy, engineering, fabrication, and erection of high temperature, high pressure ferritic and austenitic alloy piping for central station, industrial, nuclear energy, and processing plants. Quality control and test methods are given. *Pittsburgh Piping and Equipment Co.*

110—Valve Manual

Forty-page catalog B-2 is designed to help engineers select valve types, understand their characteristics, and determine space requirements. It includes such useful data as: pressure drop and flow tables, conversion tables, theory and application, recommended materials, and describes Pratt valves and operators. *The Henry Pratt Co.*

111—Insulated Piping Systems

This 90-page catalog on Ric-wiL insulated piping systems for underground or overhead use is divided into five sections, each tabbed and indexed for easy reference: Product, Engineering, Specifications, Drawings, and Installation. All engineering data have been brought up to date as of February, 1955. A revision of 1954 catalog. *Ric-wiL, Inc.*



112—Diaphragm Valves

The Saunders Patent diaphragm valve, developed for "hard-to-handle" fluids, is described in 32-page catalog V-56. The booklet covers operating features, installation views, operating data and typical services, and selection, sizing, and ordering information. Auxiliary assemblies, accessories, and special purpose valves shown. *Hills-McCanna Co.*

113—PVC Valves and Fittings

Six-page circular 601 describes Luncor all-molded, corrosion resistant PVC valves and fittings. It gives dimensions in inches and pipe fitting weights, lists chemicals resisted by PVC, and compares advantages and limitations of PVC with metal valves and fittings and tells which valves these can replace. *Lunkenheimer Co.*

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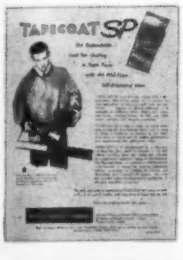
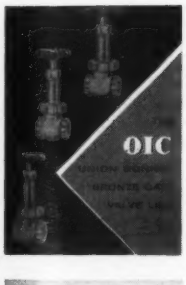


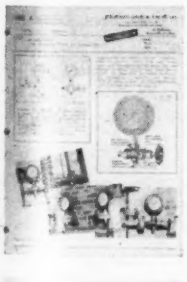
115—Pipe Protection Tape

This bulletin covers Tapecoat SP, a coal tar pitch base coating in tape form with film type, self disposing liner that widens temperature application range and permits easier handling. Liner is automatically disposed of in torching application process. Comes in widths 2, 3, 4, and 6 in., in 45-50 ft roll. *The Tapecoat Co.*



116—Gate Valves

Four-page bulletin 1006 describes the new and complete line of 125, 150, and 200 psi capacity union bonnet gate valves. Also described is the new alloy 40 stem with an increased life of 20 to 30 times that of ordinary stems, and the long lasting copper nickel alloy wedge. Specifications and dimensions are given. *The Ohio Injector Co.*



117—Instrument Piping Valves

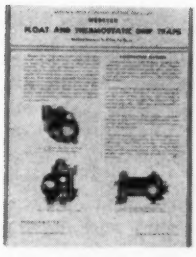
Four-page data unit 252 contains illustrations and drawings showing how this company's valves combine unions, nipples, reducers, elbows, tees, valves, and drain valves into one space-saving unit. Application information, specifications, and features are included on valves for instrument piping and for general use. *Jerguson Gage & Valve Co.*

118—Piping Insulation Manual

"Technical Data Manual," 20-page booklet, is designed to give engineers all available information on the application of Gilsulate, a new insulation for hot underground pipes. It describes the three grades, how to determine ditch size for various pipes and types of soil, and gives sample problems. *American Gilsonite Co.*

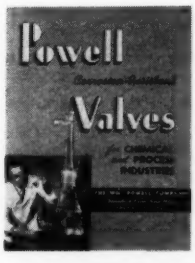
119—Pipe Insulation

Eight-page bulletin SO-1055 discusses the advantages of G-B Snap*On pipe insulation for low pressure steam and hot water, for service to 350 F, for dual temperature and cold piping, and for outdoor piping. It gives detailed application specifications for plumbing and heating and for insulation of valves. *Gustin-Bacon Mfg. Co.*



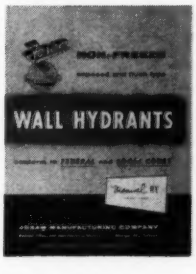
120—Drip Traps

Bulletin B-712E describes and illustrates features of the new Webster Series 27 Float-and-Thermostatic Drip Traps for working pressures up to 15 psi. Bulletin gives dimensions and recommended ratings, and discusses such advantages as compactness, light weight, and ability to handle large volumes. *Warren Webster & Co.*



121—Corrosion-Resistant Valves

"Powell Corrosion-Resistant Valves for Chemical and Process Industries," form 166, gives features of construction, photographs, and sectional drawings of valves of every design, to meet almost every flow-control requirement. The large selection of metals and alloys in which they are available is listed also. *The Wm. Powell Co.*

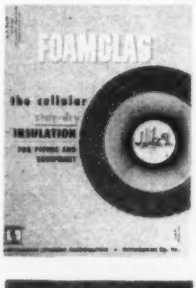


122—Wall Hydrants

Non-freeze type exposed and flush wall hydrants that conform to Federal and local codes are described in Manual HY. Cross sectional drawing is used to explain construction and special features of Josam hydrants. Suggested applications, dimensional drawings, and lists of dimensions and specifications are given. *Josam Mfg. Co.*

123—Priming Solution

This new bulletin presents the story of TC Primecoat, a new priming solution developed for use with Tapecoat coating materials. Solution is compatable with coal tar pitch base used in manufacture of Tapecoat, Tapecoat-X, and Tapecoat SP, and is recommended where primer is desired under protective materials. *The Tapecoat Co.*

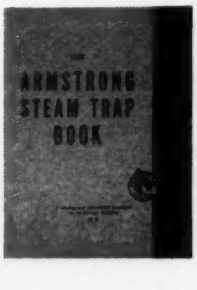


124—Piping Insulation

FOAMGLAS, the cellular stay-dry insulation for piping and equipment—what it is and how it is made—is described in eight-page booklet FI-103. It gives information on the various sizes and shapes, tables of physical properties, suggested thicknesses, specifications, and recommended shapes for specific jobs. *Pittsburgh Corning Corp.*

125—Vitrified Tile Conduit

"Go Underground with Stillwater Conduit System," four-page booklet 50, describes tunnel and round ceramic conduit systems. It points up advantages of Stillwater Conduit Systems—permanence, protection, adaptability, ease of installation, and efficiency—in any combination of service piping. *Stillwater Clay Products Co., Conduit Div.*



126—Steam Trap Manual

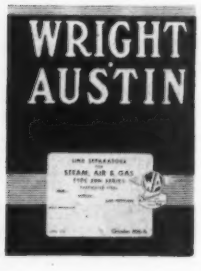
"The Armstrong Steam Trap Book, 2nd Edition," 46-page catalog J, explains the benefits of good trapping and how you can obtain them. A handbook section provides capacity charts and other data necessary to the correct trapping of all major classes of steam-heated equipment. Manual is completely indexed. *Armstrong Machine Works.*

127—Flowtrol Valve

Technical bulletin W8-A, eight pages, contains construction information and drawings, dimensions, parts lists, and specifications for the Cushioned Flowtrol Valve. Unit is specially designed to replace troublesome globe, angle, plug, or gate valves that require frequent manual opening and closing. *Golden-Anderson Valve Specialty Co.*

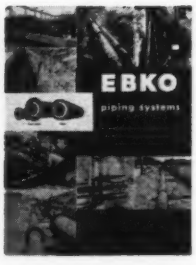
128—Corrosion Resistant Fittings

This 22-page catalog explains how Speedline corrosion resistant fittings reduce piping costs by allowing the designer to take advantage of the new and more economical Schedules 5 and 10 stainless steel pipe. A schematic drawing illustrates use of these fittings for a wide range of industrial applications. *Horace T. Potts Co.*



129—Line Separators

Line separators for steam, air, and gas, for high, medium, and low pressures, are described in six-page circular 506-A. Applications, principles of operation, specifications, and dimension table are given. Steam, air, and natural gas selection and capacity charts are included to aid in specifying and ordering. *Wright-Austin Co.*

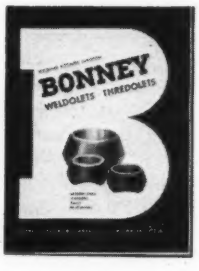


130—Prefabricated Piping

EBKO Piping systems, prefabricated and insulated, for underground and overhead service are described in four-page booklet 6c/Ka. Viscous liquid piping systems, heat exchangers, and suction heaters are also discussed and shown in typical installations and in elevation drawings with dimensions and specifications. *E. B. Kaiser Co.*

131—Design Properties of Pipe

"Design Properties of Pipe," ten-page bulletin TT 330, presents in table form all the dimensional data needed to determine wall thicknesses required to resist internal pressure, bending stresses resulting from line expansion or caused by weight loadings, and column sizes required to sustain specified axial loads. *Tube Turns, Inc.*



132—Fittings

This bulletin illustrates when and where to use Weldolets, Thredolets, and Socket Weldolets. Specific areas of application are shown with correct installation procedure. It describes the complete range of stainless, alloy, and nonferrous fittings and Bonney's new marking standard. *Welding Fittings Div., Bonney Forge & Tool Works.*

PLANT SITE SELECTION

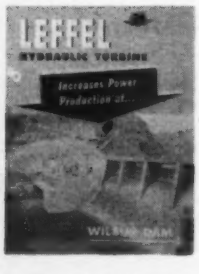
133—Plant Site Selection

"Look Where a Site is Production-Right," 24-page brochure, presents data useful to consultants and executives responsible for new plant location. Illustrated with colored maps, it describes power, fuel, labor, water, weather, key materials, transportation, and plant sites that offer best possibilities. *Baltimore and Ohio Railroad.*

134—Plant Site—Marley Neck

"Where Can You Pick a Plant Site Plum Like This?" is a broadside describing the largest deepwater plant site on the Atlantic seaboard, Marley Neck, Port of Baltimore. The booklet includes colored maps and a comprehensive air view of some 4200 acres on Chesapeake Bay near the heart of the city. *Baltimore and Ohio Railroad.*

POWER EQUIPMENT & FUELS

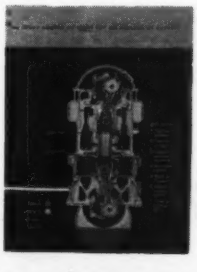


135—Hydraulic Turbines

Details on Leffel turbine installation at TVA's Wilbur Dam are given in bulletin 1086. Other literature on hydraulic power includes bulletin 1095, "Philpott Dam Power Project"; bulletin 1098, "Chandler Power and Pumping Plant"; bulletin 1091, "Chatuge Dam Power Project"; bulletin 1094, "Nattley Dam Power Project." *The James Leffel & Co.*

136—Heavy Duty Engines

"The W-9 Engine," four-page catalog S-500-B62, illustrates and describes construction features and gives ratings for six and eight cylinder engines operating at 900 and 1000 rpm. Included is a cutaway detail drawing of the Jet-Swirl design incorporated in the intake manifold. Specifications are given. *Worthington Corp.*



137—Diesel Engine

Here in color is a detailed "working model" of the Fairbanks-Morse Opposed-Piston Diesel Engine. By actually moving the pistons through an entire cycle of events you see the simplicity of the O-P that has no valves, intricate valve trains, cylinder heads, or gaskets — 40 percent fewer moving parts. *Fairbanks, Morse & Co.*

138—Condenser Expansion Joints

Discussion of expansion problems of turbine exhausts with special reference to modern, large or twin condensers is presented in this four-page bulletin. It shows construction of the Henry Pratt Rubber Belt Expansion Joint, and details advantages, such as simplified engineering of piping and temperature tolerance. *The Henry Pratt Co.*

139—Air Preheater

How the Ljungstrom air preheater saves fuel, while improving performance of boilers, is told in 38-page bulletin. It gives structural details of the unit, points out ease of installation, how to modernize old installations, industrial uses, arrangements, specifications, and suggests typical additional uses. *Air Preheater Corp.*

140—Water Tube Generators

Water tube Type D Superior steam generators with capacities up to 50,000 lb steam per hour are described in eight-page bulletin. With the literature comes a 12-page folder of specifications prepared to aid consulting engineers in selection, evaluation, and specification of water tube packaged units. *Superior Combustion Industries, Inc.*

141—Ejectors

This 12-page bulletin describes the principle of operation of steam jet air ejectors for modern, low-cost air removal from condensers. It considers ejector classification, inter-after condensers, steam jets for special services, and includes pressure and temperature conversion tables. *Condenser Service & Engineering Co., Inc.*

142—Reduce Steam Cost

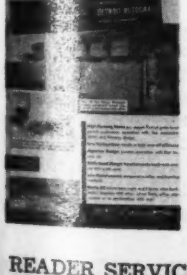
"The Cyclone Furnace," 20-page bulletin G-65, tells how use of this type of equipment reduces cost of steam generation by reducing fly-ash emission, simplifies ash handling and disposal, eliminates need for pulverizers (furnace uses crushed coal), and reduces maintenance. Specifications are given. *The Babcock & Wilcox Co.*

143—Spiral-Wound Gaskets

General catalog, 28 pages, tells about the development of the original spiral-wound gasket and its present applications in aviation, atomic research, process industries, power plants, and ships of the Navy and Merchant Marine. It also lists various metals and fillers used in the manufacture of these gaskets. *Flexitallic Gasket Co.*

144—Convertor Rating Tables

Bulletin 62, 16 pages, has been designed in answer to the need for convertor rating tables that are accurate and arranged for rapid and easy reading. At least three Type R U-tube Convertor sizes are listed for each set of operating conditions, depending on pressure drop limitations. Booklet is indexed for quick reference. *Whitlock Mfg. Co.*



145—Spreader Stokers

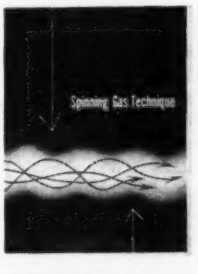
"Let's Take a NEW LOOK at Spreader Stoker Firing," four-page bulletin 18, points out the advantages of the Roto-Grate Spreader Stoker for medium and large boilers up to 400,000 lb steam per hr. Elevation drawing shows construction and operation of the unit. Other types of stokers are described briefly. *Detroit Stoker Co.*

146—Boiler-Burner Units

Revised, 16-page catalog 501 illustrates and describes the entire line of Kewanee-Iron Fireman boiler-burner units for both high and low pressure steam and hot water. It gives ratings, data, and dimensions on high pressure units in 13 sizes—from 39 to 456 hp; and for 13 low pressure units. *Kewanee Boiler Div. of American-Standard.*

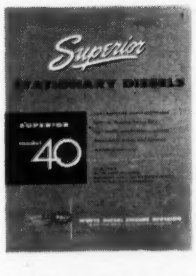
147—Burners

The Roto-Press burner described in eight-page booklet 9101 is designed to meet the demand for maximum steam, automatic firing, minimum floor space, and elimination of high stacks. How to convert your client's standard rotary burner to a Roto-Press is explained by means of text and pictures. *Products Division, Todd Shipyards Corp.*



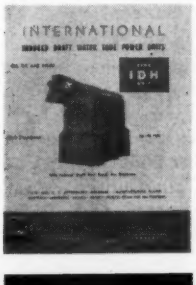
148—Spinning Gas Technique

The Continental boiler's spinning gas technique—a method of obtaining maximum heat transfer with simplified design—is presented in this four-page bulletin. Cutaway views and diagrammatic drawing illustrate air intake and flow of hot gases. Technique applies to boilers from 20 to 500 hp, 15 to 250 psi. *Boiler Engineering & Supply Co., Inc.*



149—Diesel Engines

Superior Model 40 Diesel Engines from 215 to 1025 hp are covered in this bulletin. Heavy duty features such as fully-bedded crankshaft, individual cylinder heads and pumps, and full pressure lubrication with increased output in the same space as earlier models are pointed out and illustrated. *White Diesel Engine Div., The White Motor Co.*

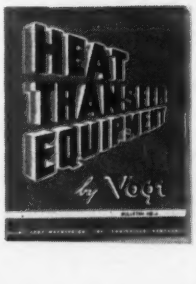


150—Water Tube Power Units

The Type IDH induced draft water tube power units for commercial and industrial use are illustrated and described in six-page folder 400. Complete specifications and installation drawings are given for units with working pressures of 125 to 150 psi, oil or gas fired, and shipped ready to install. *International Boiler Works Co.*

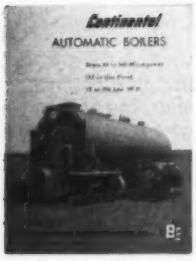
151—Equipment Catalog

The complete line of equipment produced by Cooper-Bessemer (compressors, pumps, engines) is detailed in eight-page bulletin. Features of each of the many products are summarized as to design and construction. Horsepowers, pressures, capacities, and other pertinent data are given with applications. *The Cooper-Bessemer Corp.*



152—Heat Exchangers

Bulletin HE-6 is a 28-page pictorial presentation of standard and custom built heat exchangers, constructed from steel, non-ferrous materials, or alloys, to meet every temperature, pressure, or vacuum service in conformity to all codes. Features of design and construction are given for each type of heat exchanger. *Henry Vogt Machine Co., Inc.*



153—Fire-Tube Boilers

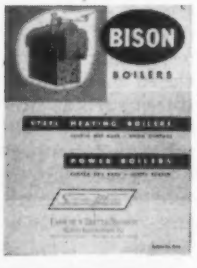
Continental Automatic Boilers—packaged, horizontal, fire-tube units for high or low pressure, oil, gas, or combination fired—are described in six-page bulletin BE3. Bulletin also enumerates the points to look for in selecting a packaged boiler. Cutaway view shows details of design and construction. *Boiler Engineering & Supply Co.,*

154—Underfeed Stokers

The Detroit UniStoker, a plunger feed, stationary grate, side-cleaning stoker available in sizes for 125 to 250 hp boilers, is described in 16-page bulletin 604. Drawings, photos, and cutaways are used to show how the stoker operates, its advantages, and its application to various types of boilers. Each component is described. *Detroit Stoker Co.*

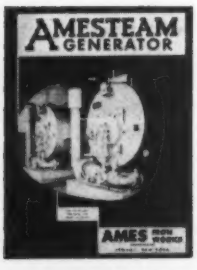
155—VP Package Boilers

Catalog P391, 16 pages, describes the new Type VP package boiler. Following a section of background information is an outline of principal design features. These boilers are shop assembled and provide steam capacities from 4000 to 42,000 lb per hr. Space requirements and specifications are in table form. *Combustion Engineering, Inc.*



156—Boilers

Two types of Bison boilers—Scotch wet back steel heating boilers and Scotch dry back power boilers—are described in 12-page bulletin B-55. Ratings and dimensions and complete specifications are given for each model. Installation photographs show the boilers in use in various industries and commercial buildings. *Adsco Industries, Inc.*



157—Package Steam Generators

Seven-page bulletin AXY-1 gives full operating details and describes changes that have been made in the Amesteam generator, which is factory assembled, for 15 to 200 psi pressure. Units offer accessibility for inspection and maintenance, automatic snapswitch start, and automatic low water and flame protection. *Ames Iron Works, Inc.*

158—Surface Condensers

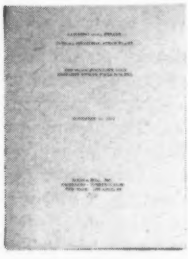
The Ross Twin-Bank Balanced Flow Surface Condensers are described and illustrated in 32-page bulletin 8.2K1. It shows the condensers in use in public utility and industrial power plants throughout the world. Design information includes discussion on all-welded construction. *Ross Heat Exchanger Div. of American-Standard.*

159—Diesel and Dual-Fuel Engines

A complete catalog containing 60 pages describes diesel and dual-fuel engines (including sewage gas engines) ranging from 100 to 2150 hp. Engines are available with speeds to suit a wide range of fixed or skid-mounted engine applications. Cross sections and graphs give engineering data. *White Diesel Engine Div., The White Motor Co.*

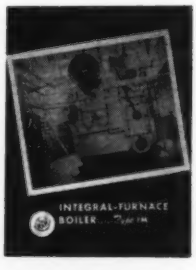
160—Steam Condensers

Some of the recent additions to this company's line of power plant condensers are pictured and described in this 24-page booklet. Included are sections on condenser engineering design factors, air removal equipment, steam condenser specialties, and maintenance. Specifications are given. *Condenser Service & Engineering Co., Inc.*



161—Steam Plant Design

"The Fairmont Coal Bureau Typical Industrial Steam Plant" is a guide for the consultant interested in conservative designs for modern coal burning. It contains specifications, layout drawings, and detailed cost estimate for a plant using two 60,000 lb steam per hr units and providing for a future third. *Fairmont Coal Bureau.*



162—Integral Furnace Boiler

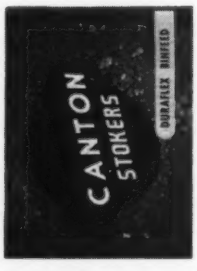
Bulletin G-76C points out savings in installation and erection cost, economy of operation, and ease of maintenance with the B&W Integral Furnace Boiler Type FM — a shop-assembled unit available in sizes ranging from 2900 to 40,000 lb steam per hr, at pressures to 235 psi. Capacities and dimensions are included. *The Babcock & Wilcox Co.*

163—Package Boilers

How Superior's four-pass boiler design lowers steam costs is explained in 20-page booklet. Rotary burner, gas burner, controls, and built-in induced draft feature are each described. Cutaway drawing shows path of combustion gases through the four passes. Data and dimensions are presented in table form. *Superior Combustion Industries, Inc.*

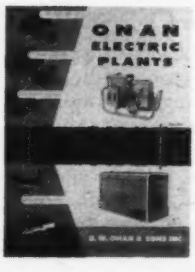
164—Packaged Generator

In 16-page bulletin 509-A you will find complete descriptions and engineering data on steam generators. Boilers are wet-back — eliminating refractories — and are built in a range of sizes from 75 to 750 hp, self-contained, fire tested, and ready for operation. Pressures are 15 to 250 psi. Specifications are listed. *Johnston Brothers, Inc.*



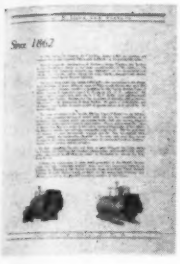
165—Wormfeed Stokers

Modern boiler room layouts and floor plans are provided in eight-page bulletin on the Duraflex Binfeed, a wormfeed stoker for industrial and commercial installations. Side ash dumps, extra grate area, and zoned windbox are a few of the features described. Available auxiliaries and accessories are listed. *Canton Stoker Corp.*



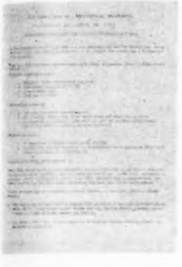
166—Electric Plants

Onan electric plants for portable, mobile, or stationary service are described in eight-page catalog A-428. A model selection guide is given for each of four types — 1-cylinder air-cooled gasoline; 2-cylinder air-cooled gasoline; 4, 6, and 8-cylinder water-cooled gasoline-driven models; and air-cooled diesel models. *D. W. Onan & Sons, Inc.*



167—Boilers and Stokers

Complete descriptive and specification information on rugged Scotch boilers for gas, oil, and coal firing, and automatic underfeed stokers for Scotch type boilers, is given in 28-page bulletin 236. This well illustrated brochure includes test results, performance data, and complete details of design and construction. *The James Leffel & Co.*

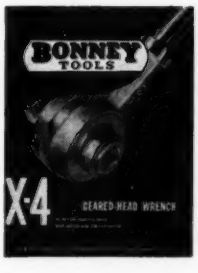


168—Electric Plant Fuels

Technical bulletin T-015, 15 pages, discusses operation of Onan electric generating plants on gaseous fuels (not gasoline). Modifications necessary to convert from gasoline to gas fuels; power comparison between natural gas, manufactured gas, butane or propane LP; and tank and pipe sizes are given. *D. W. Onan & Sons, Inc.*

169—Vertical Unit Boilers

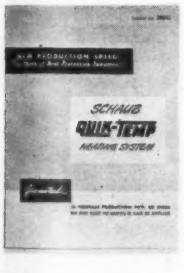
More than 25 years of development, manufacturing, and application experience are reflected in the design of the Type VU-10 vertical-unit boiler described in 16-page bulletin VU 10-8. Advantages and design features are discussed. Possible installations are shown by photographs and cross sections. *Combustion Engineering, Inc.*



170—Geared-Head Wrench

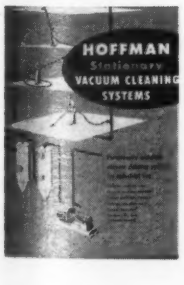
The X-4 geared-head wrench for jobs requiring rotary force settings over 2000 ft-lb is described in this four-page folder. The wrench is an intermediate unit to be used with ratchets, torque wrenches, sockets, and attachments. Torque is produced through planetary gearing. Typical applications are pictured. *Bonney Forge & Tool Works.*

PROCESS EQUIPMENT



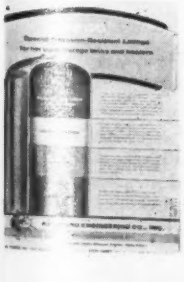
171—Hot Water Heating

Twelve-page bulletin 548-C discusses the Schaub Quik-Temp Hot Water Heating System, tells what it is, what it will do, and how it works. Several case histories are used to point out the many application possibilities and to demonstrate the 10 percent production increase guaranteed by the manufacturer. *Fred H. Schaub Engineering Co.*



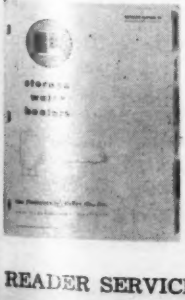
172—Stationary Vacuum Systems

"Hoffman Stationary Vacuum Cleaning Systems," 12-page bulletin A-939, gives a full description of varied uses and advantages in almost every industrial field. It contains the preliminary data needed for the design of a vacuum system to fit certain types of plants, along with drawings and photos of equipment. *U. S. Hoffman Machinery Corp.*



173—Corrosion Resistant Linings

"Special Corrosion Resistant Linings for Hot Water Storage Tanks and Heaters," four-page folder 514, describes plastic coatings and linings, cement linings, clad steel, and galvanizing for hot water storage tanks and heaters. Suggested uses for each type of lining are listed with advantages. *Richmond Engineering Co., Inc.*

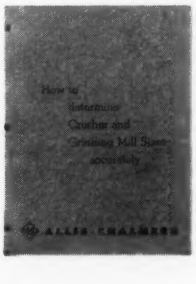


174—Storage Water Heaters

"Storage Water Heaters," 48-page catalog 19, gives construction details, storage and heating capacities, dimension tables, and standard specifications for steel, copper-lined, copper silicon, cement-lined, clad-galvanized, and Lo-Flo storage water heaters. Typical piping diagrams are included for easy reference. *Patterson-Kelley Co., Inc.*

175—Vapor Collectors

Vapor, mist, and fog control bulletin 622-3 illustrates the complete line of Aget Mistkop Vapor Collectors and gives specifications on each model. Applications throughout industry are described in detail and illustrated. Ways in which Mistkops can improve production and cut down product rejects are shown. *Aget Mfg. Co.*

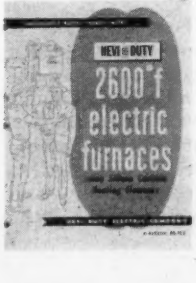


176—Crushers and Grinders

Consultants specifying crushers and grinding mills will find a wealth of useful data in 78-page book 07R9995A. Power input and size for practically any application can be determined by use of the "Work Index" method outlined. Over 70 pages of tables list work indexes for metallic and non-metallic materials. *Allis-Chalmers Mfg. Co.*

177—Combination Centrifuge

The De Laval Gyro-Tester, a combination machine that incorporated the 10 cc High-Speed Test Tube Centrifuge and the Laboratory Centrifuge, is presented in four-page folder S.A962. Use of the unit for laboratory and pilot plant work, particularly in chemical and oil research laboratories, is outlined. *The De Laval Separator Co.*



178—High Temperature Furnaces

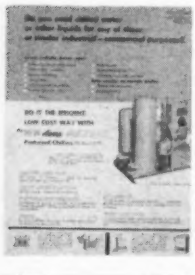
Bulletin 153, six pages, describes high temperature furnaces using silicon carbide heating elements, and designed for continuous production at high temperatures. It discusses such uses as for high temperature forging, hardening and annealing of high speed and stainless steels and production of special alloys. *Hevi-Duty Electric Co.*

179—Heat Exchangers

"Standard Heat Exchangers for Process Industries," 20-page bulletin M-306, spotlights the outstanding features of these units. Sizes and dimensions, surface areas, film coefficients, and characteristics of tubing are presented, along with a graph showing effect of fouling factors on overall heat transfer rates. *The Lummus Co.*

180—Fuel Oil Purification

"The Rutland Case" explains the difficulties encountered in the use of residual fuels for gas turbines at the Rutland plant of the Central Vermont Public Service Corp. It discusses research carried out to solve these problems, and use of the De Laval Model AC-VO Nozzle-Matic heavy fuel oil purifier. *The De Laval Separator Co.*



181—Packaged Chillers

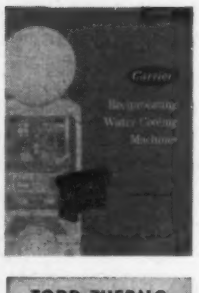
The Acme FLOW-PAC packaged chillers in 1¾ to 5 hp ratings for industrial and commercial service are described in bulletin FP-102-1C. The booklet explains how two or more chillers can be connected in parallel for over 5 ton capacity, and gives dimensions for both water-cooled and air-cooled condensers. *Acme Industries, Inc.*

182—Corrosion-Proof Linings

Four-page bulletin 4-2 describes corrosion-proof tank linings available in a variety of materials capable of solving most corrosion problems. A resistance chart lists various chemicals and the types of linings to be used in each instance. Use on concrete and steel vessels of all sizes and types is discussed. *Atlas Mineral Products Co.*

183—Pre-Heated Air for Processing

"The Ljungstrom Air Preheater for Process Equipment," 12-page bulletin, explains how use of this unit can reduce fuel costs, replace expensive still convection surfaces, and improve product quality in petroleum refineries. It also describes how the unit operates and specific advantages of the design. *Air Preheater Corp.*



184—Water Cooling Machines

Reciprocating water cooling machines with 25 to 200 hp capacities for air conditioning and process cooling jobs are described and illustrated in 36-page bulletin 30 BCD-13. Wiring diagrams, general engineering data, physical and dimensional data, capacity ratings, and guide specifications are given for each type. *Carrier Corp.*

185—Asphalt Heaters

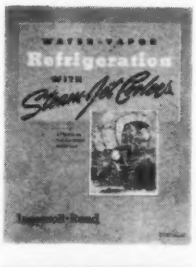
"Todd Thermo Convective Asphalt Heater," four-page folder, describes details of combustion chamber, tubular heat exchanger, and related auxiliaries. It shows how this automatic, low maintenance unit is especially designed to heat asphalt more economically and more efficiently. *Products Division, Todd Shipyards Corp.*

186—High Pressure Closures

Bulletin 5.6K1, four pages, describes high pressure closures for Ross feedwater heaters and other high pressure, high temperature exchangers. Design details are illustrated by photos and cross sections. Text discusses simplicity of design, safety factor, and ease of removal. *Ross Heat Exchanger Div. of American-Standard.*

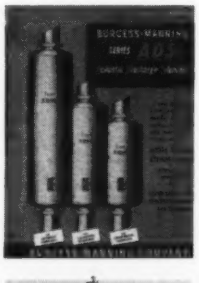
187—Shredders and Wood Hogs

Swing Hammer Shredders and Wood Hogs for lumber and allied industries are covered in 48-page catalog 855. Numerous cross sectional views, installation photos, and drawings aid in selecting a proper shredder for pulpwood plants, furniture factories, and other similar types of manufacturing activities. *Jeffrey Manufacturing Co.*



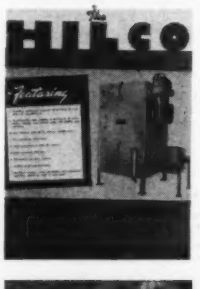
188—Water Chillers

Bulletin 9143-B outlines the many advantages of Steam-Jet Coolers for supplying commercial quantities of chilled water at temperatures as low as 35 F. Diagrammatic illustrations show how typical units operate. Construction details and dimensions are included for units to furnish from 30 to 1200 tons of refrigeration. *Ingersoll-Rand Co.*



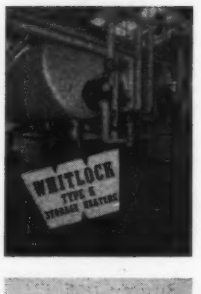
189—Silencers

Series ADS Acoustic Discharge Silencers, designed to eliminate both high and low frequency noises caused by high velocity steam and air discharged to the atmosphere, are described in four-page bulletin 265. Specifications are given for optimum silencing, standard silencing, and for heavy industrial areas. *Burgess-Manning Co.*



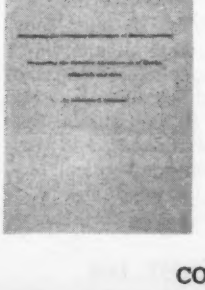
190—Oil Purifiers

Airline oil purifiers for periodic batch purification of heavily contaminated lubricating and industrial oils are discussed in four-page bulletin A-102. It gives a description of the Hilco process, features of the purifier, and a colored flow diagram that shows how the unit restores used oil to new oil value. *The Hilliard Corp.*



191—Storage Heaters

Bulletin 40B, 16-pages, has been written to facilitate selection of Type K Storage Heaters for conditions normally found in buildings of various classifications. Typical layouts are included along with tables of pressure thickness, vertical and horizontal storage heater dimensions, and capacities. *Whitlock Manufacturing Co.*

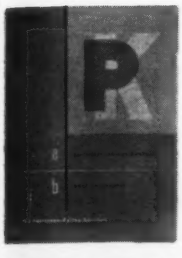


192—Crushing Resistance

"Measuring the Crushing Resistance of Rocks and Ores," 12-page booklet written by Benjamin B. Burbank, noted metallurgist, presents methods and equipment for measuring crushing resistance and abrasiveness of rocks, minerals, and ores. Detail sketches of testers are included. *Pennsylvania Crusher Div. of Bath Iron Works.*

193—Process Equipment

An integrated line of equipment for the process industries is described in 28-page catalog 25C6177K. Equipment for chemical unit operations, process plant electrical apparatus, mechanical power transmission equipment, and water conditioning equipment, chemicals, and service are described and pictured. *Allis-Chalmers Mfg. Co.*



194—Water Heating Equipment

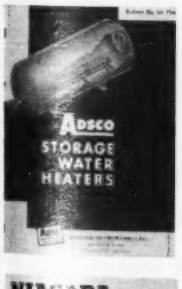
Catalog 5, 16 pages, contains tables of dimensions and capacities of storage water heaters, instantaneous heaters, convertors, and suction and discharge-side fuel oil heaters. Selection of equipment for any heating requirement may be made easily, with either steam or boiler water as the heating medium. *Patterson-Kelley Co., Inc.*

195—Heat Exchangers

"Meet the Heat Exchanger Division," 24-page brochure M304, highlights the most important manufacturing steps at the Honesdale plant of The Lummus Co. Purpose of the booklet is to demonstrate how Lummus' pool of engineering and manufacturing talent is prepared to handle almost any heat transfer project. *The Lummus Co.*

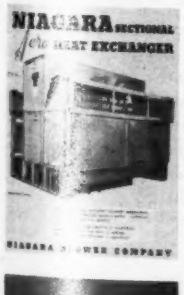
196—Corrosion-Proof Coatings

Twelve-page bulletin describes the Atlas line of corrosion-proof coatings especially designed to protect walls, ceilings, beams, exhaust hoods, fume ducts, and equipment exteriors from corrosive fumes and splash. Complete coverage, long lasting protection, minimum application cost, and application are discussed. *Atlas Mineral Products Co.*



197-Storage Water Heaters

Adsco storage water heaters for use in buildings where large quantities of hot water are needed at irregular intervals are discussed in 16-page bulletin 54-75A. Directions are given for determining heater size. Conversion tables, lists of shell and head thickness, and piping diagrams are included. *Adsco Industries, Inc.*



198—Heat Exchangers

Bulletin 132 describes the new panel casing construction method that makes the Aero Heat Exchanger fully accessible for cleaning and saves your client expense in shipping and installation. This is a self-contained cooling system for water, oils, and solutions that replaces cooler and cooling tower. *Niagara Blower Co.*

199—Moisture Measurement

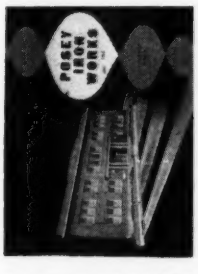
"The Measurement of Water Vapor in Air and Other Gases," by Elmer R. Queer and E. R. McLaughlin of State College, Pa., 12-page bulletin, covers such subjects as detrimental effects of moisture, properties of water vapor, and types of equipment available to measure moisture under different conditions. *Pittsburgh Lectrodryer Corp.*

200—Automatic Filters

Bulletin 131, "Hoffman 'Vac-40' Vacu-Matic Filter," thoroughly discusses this newly redesigned unit. Applications in various fields, construction, operation, and data on the filter medium and method are covered. Specifications, dimensions, flow rates, and unit capacities and a photo are given for each type. *U.S. Hoffman Machinery Corp.*

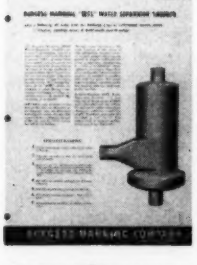
201—After-Coolers

Eight-page bulletin 130 describes and illustrates, with diagrams and photographs of installations, after-coolers for cooling compressed air or gases below ambient atmospheric temperatures, thus preventing condensation in service lines. Units are independent of cooling water supply. Air liquefaction also is described. *Niagara Blower Co.*



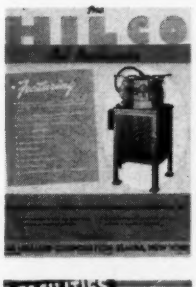
202—Company Background

This 16-page booklet was designed to acquaint you with the Posey Iron Works Co.—its six divisions, Steel Plate, Brick Machinery, Iroquois, Foundry, Industrial Heating, and Steel Form—and the manufacturing advantages provided by their extensive facilities. Typical products of each are pictured. *Posey Iron Works, Inc.*



203—Snubbers

The "WSS" Water Separator Snubber, for removing all water from the discharge gases of water-sealed vacuum pumps and for silencing discharge noises, is presented in two-page bulletin 270. It gives specifications, elevations, and a table of dimensions along with a general description of the various types. *Burgess-Manning Co.*

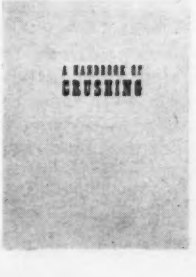


204—Oil Reclaimers

Four-page bulletin R-160 presents an oil reclaimer for purification of vacuum pump lubricating and sealing oil. The unit can be connected directly to one or more pumps for continuous or intermittent purification or can be used for batch purifying from storage tanks where direct connection is impossible or impractical. *The Hilliard Corp.*

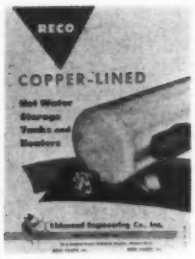
205—Fabrication

"Facilities and Products," 40-page brochure, tells how this company is now utilizing facilities developed during the war for producing peacetime products. Photos show production of such widely diversified products as paper-making machinery, hydraulic turbines, tanks, and pressure vessels. *Newport News Shipbuilding and Dry Dock Co.*



206—Handbook of Crushing

"Handbook of Crushing," 40-page booklet, presents a wealth of data for any engineer faced with the problem of selecting the proper crusher for a certain job, or with analysis of a present installation. It gives details of selection, capacities, arrangements, types, and sizes. *Pennsylvania Crusher Div. of Bath Iron Works Corp.*



207—Hot Water Storage

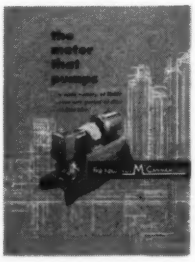
"Reco Copper-Lined Hot Water Storage Tanks and Heaters," four-page folder 513, gives specifications, special construction details, and cutaway drawings of steel-shelled, horizontal and vertical copper-lined tanks and heaters. It discusses briefly the full line of fabricated heat exchange equipment. *Richmond Engineering Co., Inc.*

For your personal copies of these bulletins, please fill out the card between pages 4 and 5 or 20 and 21.

PUMPS & COMPRESSORS

208—Chemical Processing Pumps

This four-page folder provides descriptions of 15 BJ pump styles with application to the chemical processing industries. It also includes information on BJ mechanical seals; sealed, oil filled motors for special service; and Vibrotron electronic gages for measurement and control of pressure, temperature, flow. *Byron Jackson Pumps, Inc.*

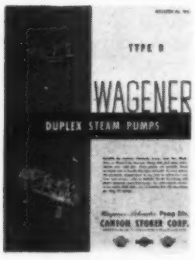


213—Meter Pump

Eight-page bulletin 300 describes the features of the improved McCanna-meter—improved accuracy at small flow rates and capsulated liquid end for easy maintenance. Capacity tables, a sectional drawing schematic, and ordering information are given. Capacity range is from 11 cc per min to 6 gph. *Hills-McCanna Co.*

209—Pump-Motors

Hydraulic pump-motors for high torque, low speed power transmissions in petroleum, construction, agricultural, and industrial fields are discussed in eight-page bulletin 22. It describes flexibility of installation, safety, and economy of operation. Performance curves and dimensional data and specifications are given. *Geo. D. Roper Corp.*



214—Steam Pumps

The Type B Wagener duplex steam pump, suitable for asphalt, molasses, syrup, lard, mash, sewage, heavy oil, and other liquids over 1000 SSU, is described in four-page bulletin WS-46. Specifications, dimensions, and table of standard sizes are provided, along with a typical section drawing. *Wagener-Schrader Pump Div., Canton Stoker Corp.*

210—Gas and Air Compressors

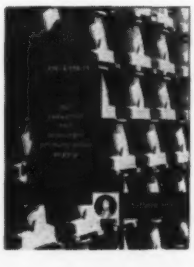
Bulletin M-70, 40 pages, presents the M-Line Compressors for transmission of gas and air. Installation photos show these units in use on pipelines, in refineries and chemical plants, and used for air compression in industry. Cross sections and cutaways are included for many of the available types of compressors. *Cooper-Bessemer Corp.*

215—Double Suction Pumps

Performance data, dimensions, and specifications on the De Laval single-stage double-suction Types L, M, and P centrifugal pumps, with capacities of 1000 to 20,000 gpm and heads to 350 ft, are presented in six-page bulletin 1004. Features, construction, dimensions, and advantages are described. *De Laval Steam Turbine Co.*

211—Industrial Service Pumps

Vertical industrial service pumps for transfer and process service, for extra heavy duty, special duty, and heavy duty are detailed in 16-page bulletin B-505. Factors of good and bad sump design are diagramed and a bibliography given. Photographs of these pumps in use for typical types of service are included. *Peerless Pump Division.*



216—Vertical Turbine Pumps

Verti-Line vertical turbine pumps for industrial and municipal primary water supply are described in eight-page bulletin 100. Detailed drawings of pumping and distribution system; condensed selection tables of horsepower, head, and capacity range; and sectional views of special features are included. *Layne & Bowler Pump Co.*

212—Turbine Pump Drives

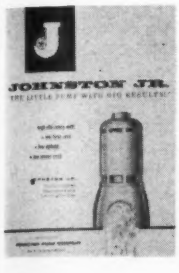
Right angle turbine pump drives, in standard and combination drive installations and available in a wide range of models to meet specific requirements of high or slow speed prime movers and pumps, are described and illustrated in nine-page catalog 27. Tables and charts show power ratings and average efficiencies. *Johnson Gear & Mfg. Co.*

217—Vertical Turbine Pumps

Descriptive material on both oil and water lubricated vertical turbine pumps, together with typical uses and detailed cutaway drawings in bulletin 1015 show simplicity of construction for minimum maintenance. Pump sizes range from 4 to 30 in., ¼ to 1000 hp, lifts to 1000 ft, with capacities 25 to 10,000 gpm. *Johnston Pump Co.*

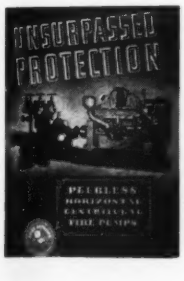
218—Submersible Booster Pumps

Verti-Line submersible booster pumps and motors (designed by Layne & Bowler and General Electric) are described in four-page folder 400. It gives specifications, selection tables, and application data. Sketches show pumps in typical installations for cooling tower service, sump operation, and fire protection. *Layne & Bowler Pump Co.*



219—Vertical Turbine Pumps

Bulletin 1016 describes the low-cost Johnston Jr. vertical turbine pump, designed for users requiring a compact unit with big performance. The booklet points out that the unit provides lifts to 200 ft and capacities from 5 gpm, a choice of drives, and is available with 2, 3, 5, 7½, and 10 hp. *Johnston Pump Co.*



220—Fire Pumps

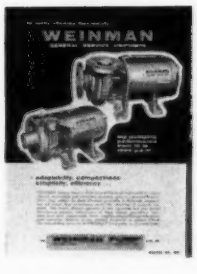
Bulletin B-1500, 36 pages, describes a complete line of Underwriters and Factory Mutual approved pumps. Pumps are listed according to capacity and by types of drives. Booklet includes new data on fittings, typical specification sheet, and six pages of selection tables. Slide rule for figuring gpm's will be included. *Peerless Pump Division.*

221—Screw Pump

Screw pumps for non-lubricating fluids and semi-fluids are featured in six-page folder SE-5. A large cutaway view shows construction features. Applications, advantages, and specifications are listed. Company also makes Gearex and Hydrex pumps for lower pressures which are described also. *Sier-Bath Gear and Pump Co., Inc.*

222—Submersible Pumps

This 68-page portfolio—especially compiled for the consulting engineer—contains a series of engineering fact sheets on the submersible pump, complete with drawings, charts, and performance curves. It includes information on selection, applications, special benefits of design, and trouble shooting. *Byron Jackson Pumps, Inc.*



223—General Service Pumps

Bulletin 200, four pages, details general service Unipumps with capacities of 10 to 1800 gpm, for efficient operation when either horizontally or vertically mounted on floor or wall. Minimum space requirements, and low operating and maintenance costs are pointed out. Tables and drawings give pump and motor sizes. *Weinman Pump Mfg. Co.*

224—Centrifugal Compressors

Multi-stage centrifugal compressors, available for inlet volumes of 1000 to 150,000 cfm, are described in ten-page bulletin 0504. Typical installation photographs show the units in use in steel mills, oil refineries, for non-ferrous metal refining, chemical processing, sewage treatment, and food industries. *De Laval Steam Turbine Co.*

225—Centrifugal Pumps

Four-page bulletin 256DS describes the Type L double suction split case centrifugal pumps designed for low, medium, and high head service in heavy duty pumping. Versatility of design that permits pump rotation to be changed in the field without use of new parts is described. Dimension table is included. *Weinman Pump Mfg. Co.*

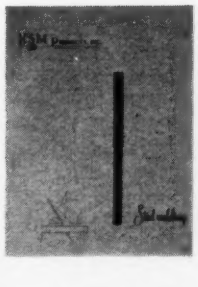
STRUCTURAL MATERIALS & EQUIPMENT

226—Pre-fab Buildings

"New . . . Site-Styled Rigid-Frame Buildings," folder 1-101, gives the answer to your clients' additional space requirements. Design features, such as flashing and trim, translucent skylight, doors, louvers, and steel sash, are described. Specifications are given and directions for forming various combinations. *Stran-Steel Corp.*

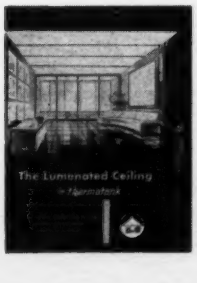
227—Concrete Densifier

"Plastiment Concrete Densifier," four-page bulletin PCD, describes the effects of Plastiment on the gel formation, uniformity, cracking, and watertightness of concrete, and how its use improves concrete quality at all temperatures. Specifications and complete test data will be sent with the folder. *Sika Chemical Corp.*



228—Stud Welding

"Stud Welding" is a collection of bulletins covering the various types of construction for which this method of fastening may be used. It includes data on fasteners, equipment, and application methods for fastening aluminum, steel, and asbestos corrugated roofing and siding, and flat asbestos and insulation board. *KSM Products, Inc.*



229—Lumenated Ceiling

Eight-page booklet 7d/Lu shows how the Lumenated Ceiling, consisting of rows of corrugated vinyl plastic sheets, fits in with modern trends in wall-to-wall illumination of interiors in new and existing buildings. It carries UL label for suspension under sprinkler heads without increasing fire insurance premiums. *Thermotank, Inc.*

230—Glass-Aluminum Curtain Wall

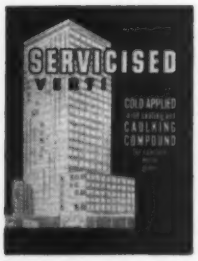
Four-page bulletin BRH-1 describes HUETEX, Blue Ridge Glass' new spandrel or curtain wall material—a low maintenance, high quality tempered glass with permanent ceramic color and atomized aluminum welded into one panel. Insulating properties are discussed and color chips show standard colors. *Blue Ridge Glass Corp.*

231—Heavy Equipment Grouting

Techniques for non-shrink grouting of heavy equipment and machinery are shown clearly in this eight-page grouting guide EPMG-2. Included are illustrations of 12 machinery settings and temperature control tables for hot and cold weather grouting. Shrinkage, impact, and vibration of Pre-Mixed Grout are discussed. *The Master Builders Co.*

232—Unit Wall

A new design tool, 12-page brochure 56004, completely describes the new Kawneer "Unit Wall" curtain wall system for one and two-story buildings. It explains how this system of standardized components makes possible 2582 different combinations of wall units, including door units, for economical construction. *Kawneer Co.*

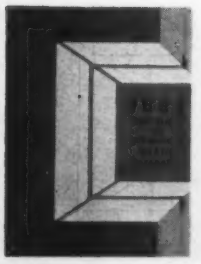


233—Sealing and Caulking

This bulletin describes Vertiseal, a newly developed rubber-type cold applied self-vulcanizing joint sealing and caulking compound that can be applied to both exposed vertical and horizontal joints. Compound has excellent adhesive properties, according to the booklet, and will bond to concrete, metal, and glass. *Servicised Products Corp.*

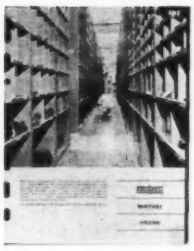
234—High Density Concrete

This 12-page illustrated booklet describes high-density Prepakt concrete for reactor construction. It gives details on composition and placement methods using heavy aggregates, and includes data on results of completed work using the Prepakt method. Photographs and detailed diagrams are given also. *Intrusion-Prepakt, Inc.*



235—Joint Sealer

Four-page bulletin IS-56, "Igas Joint Sealer, the Non-Meltable Mastic Waterstop," describes the properties of Igas, its use in water reservoirs, swimming pools, tunnels, and deep basements, and its suitability for all structural materials. Specifications and architectural details will be sent also. *Sika Chemical Corp.*

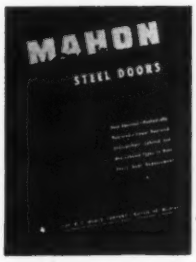


236—Adjustable Steel Shelving

The versatile Hallowell system of adjustable steel shelving is described in this 28-page catalog. It covers various types of open and closed shelving, shelving cabinets with swinging and sliding doors, and counter-type shelving units. Possible arrangements of shelving accessories such as drawers are shown. *Standard Pressed Steel Co.*

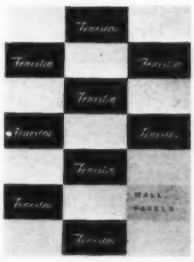
237—Interior Metal Trim

The wide selection of Milcor standard wall units, steel window stools, bases, stop moulds, cove moulds, picture moulds, chair rails, and blackboard trim is described in 20-page catalog 102, revised for 1956. It contains specifications, photos, drawings, installation details, and measurement information. *Inland Steel Products Co.*



238—Steel Doors

Rolling steel doors, grilles, and shutters to meet every requirement of industrial or commercial use are carefully and completely described in 16-page bulletin G-56. Drawings, tables of clearance dimensions, standard and special applications, engineering data, and specifications make this a good reference bulletin. *The R. C. Mahon Co.*



239—Metal Wall Panels

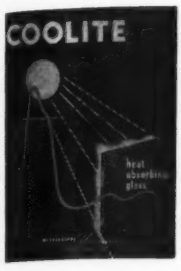
This catalog for engineers and architects presents Fenestra insulated panels and siding for curtain wall construction. Complete with installation details, span tables, engineering data, and specifications, it gives reasons for using lightweight panel walls. It covers also acoustical wall panels and movable fire partitions. *Fenestra, Inc.*

240—Bearing Pile Tests

"H-Beam Bearing Pile Tests in Chicago," 12-page bulletin, gives the results of the tests conducted by Armour Research Foundation for U.S. Steel to determine the over-all performance of steel H-beam bearing piles in soil strata found in the Chicago Loop area. Data are tabulated, charted, and discussed in detail. *United States Steel Corp.*

241—Asbestos Cement Roofing

Corrugated asbestos cement roofing and siding is discussed in detail in 16-page data booklet 2032 including specifications, sheet applications, fasteners, closure strips, ridge roll, and trim. Section drawings show application of this company's product, known as Asbestone, to wood and steel frames, and gutters. *National Gypsum Co.*



242—Heat Absorbing Glass

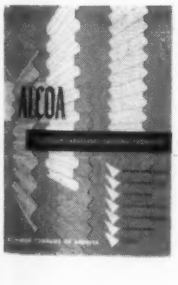
The two types of Coolite glass, standard Coolite for absorbing the sun's heat and Glare Reducing Coolite for absorbing heat while reducing glare, are described in this 16-page bulletin. It explains when and where to use the two types and gives specification data and photographs of typical installations. *Mississippi Glass Co.*

243—Floor Grating and Steps

Eight-page bulletin AT 155 gives complete directions for specifying all types of floor grating and safety steps—all-welded, pressure locked, and riveted. It describes all purpose floor grating of standard and ornamental design, safety grating, types for roadways, and for small building openings. *Borden Metal Products Co.*

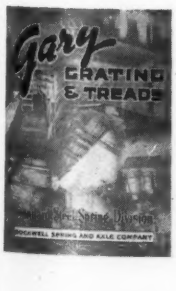
244—Joint Fillers and Sealers

Specifications and recommended uses for premolded and hot-poured joint fillers and sealers for concrete construction work, asphalt planks for flooring and bridge decking, corrugated closure strips for corrugated construction, rubber water stops, and similar products are presented in 12-page booklet. *Servicised Products Corp.*



245—Aluminum Building Products

"Alcoa Aluminum Industrial Building Products," 32-page bulletin AD-285, gives a complete list of Alcoa's corrugated industrial roofing and siding products. Included are recommended fasteners and accessories, suggested specifications, and recommendations for erection of this roofing and siding. *Aluminum Company of America.*



246—Grating and Treads

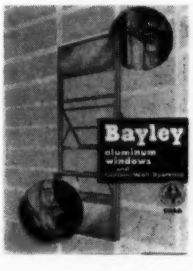
Gary grating and treads tailor-made to suit your individual requirements are illustrated in a 24-page brochure. Two-page spread includes tables of safe loads, specifications, and other engineering data. Photographs also show many typical applications of the decking. *Standard Steel Spring Div. of Rockwell Spring and Axle Co.*

247—Steel Stair Treads

Tread-Grip steel stair treads combine strength of construction with safe, non-slip footing, according to four-page booklet HTP2130. It describes such features as A. W. Algrip nosing, electroforged and welded construction, and twisted cross bars. Detail drawing and tables of dimensions are included. *Horace T. Potts Co.*

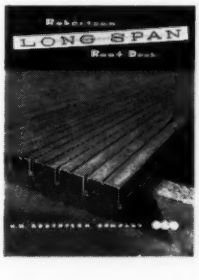
248—Industrial Doors

Bulletin 88, 24 pages, is a complete catalog of the many types of doors made by Kinnear. It gives information on the types of operation, both manual and electrical; elevation drawings; mounting methods for various applications and locations; specifications; and explains special construction features. *Kinnear Mfg. Co.*



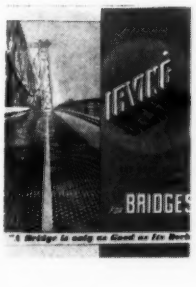
249—Aluminum Windows

Curtain wall designs using the Bayley curtain-wall system with aluminum projected windows are illustrated and explained in 28-page bulletin BAPW56. Suitability of this type of window—provided with or without screens—for buildings of all types of construction and architectural treatment is discussed. *The William Bayley Co.*



250—Roof Deck

This bulletin describes Robertson's newest product, Long-Span Q-Deck, a deck that will span greater distances without loss of load-carrying capacity. Its use in school and other construction where cost is of prime importance is shown in detail drawings with lists of specifications and engineering data in table form. *H. H. Robertson Co.*



251—Bridge Decking

"Decking for Bridges" catalog contains drawings, photos, descriptions, and engineering data on open metal grid bridge roadways. It points out advantages such as light weight, cleanliness, drainage, safety, durability, strength, and traction, as well as the economies effected through minimum maintenance and long life. *Irving Subway Grating Co., Inc.*

252—Concrete Wall Panel Buildings

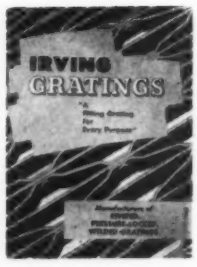
Insulated precast concrete wall panels and rigid steel framing combined in custom "panel bilt" buildings are shown in four-page pamphlet 7285. Panel and structural details are shown for each industrial and commercial purpose described. How this type of construction saves time and money is explained. *The Marietta Concrete Corp.*

253—Grating

Safety Grip-Strut, an anti-skid grating in which the vertical members are joined by integral saddles to create lateral struts of great strength, is described in 12-page booklet. General applications, installation and assembly, and fastening devices are discussed. Load tables are given for both steel and aluminum grating. *Globe Co.*

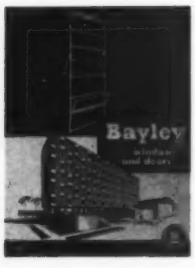
254—Metal Wall Construction

"1956 Metal Wall," product catalog insert, contains typical installation pictures of Kawneer Metal Wall—a new concept in metal wall construction. Detailed sections of spandrels, windows, and mullions and jambs are shown to give a clear picture of this type of construction—its advantages and special uses. *Kawneer Co.*



255—Grating Products

This grating products catalog contains illustrations, descriptions, and engineering data on grating-flooring, treads, and industrial floor armoring for walkways, stairways, aisles, floors, bridge decking, and many other industrial and commercial uses. Riveted, pressure-locked, and welded type products are shown. *Irving Subway Grating Co., Inc.*



256—Steel Windows and Doors

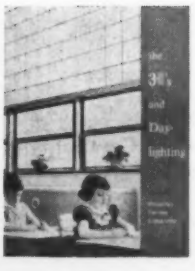
In 36-page bulletin BSW-56, Bayley Steel Windows and Doors (also operating units and accessories) are shown in layouts and sizes to modular standards recommended by the Metal Window Institute. Included are drawings and specifications for the new intermediate steel window wall, Series S-150. *The William Bayley Co.*

257—Gypsum Roof Deck

Specifications, detail drawings, and total load tables for "poured-in-place" gypsum roof deck are included in bulletin 589 in handy loose-leaf form, ready to slip into a notebook. Sample problems and solutions demonstrate use of the load chart. Included are Gold Bond Insulation and Asbestos Cement form boards. *National Gypsum Co.*

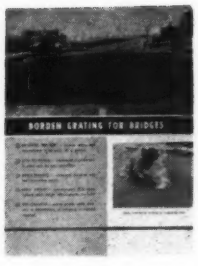
258—Glass Products

Catalog 56-G contains data on the complete line of Mississippi glass products for use in the general building market, industrial, commercial, school, and light construction industries. These products include structural and non-structural figured and wire glass, and Coolite glass for heat absorption and glare reduction. *Mississippi Glass Co.*



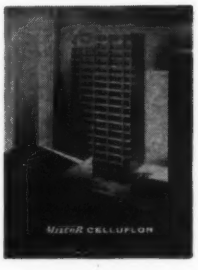
259—Glass Block Lighting

"The 3 R's and Daylighting," 12-page booklet GB-106, presents the new approach to school lighting based on a lighting pattern throughout the entire working area, from which all glare and sharp brightness contrasts have been removed or reduced to a minimum. How glass blocks fit into the picture is discussed. *Pittsburgh Corning Corp.*



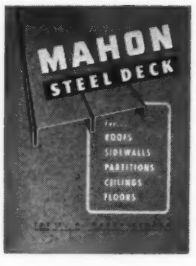
260—Bridge Grating

"Borden Grating for Bridges," eight-page booklet, describes standard and long span roadway grating, standard and lightweight sidewalk slabs, and standard package beam bridges. It gives design conditions, load tables, specifications, and detailed information to help in specifying these products. *Borden Metal Products Co.*



261—Cellular Floor

Design and construction advantages of Milcor Celluflor, including electrical flexibility for the future of a building, are discussed in 16-page catalog 270. It contains a table of types and section properties, required section properties for uniform loads and simple spans, engineering data, and construction details. *Inland Steel Products Co.*

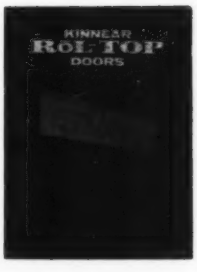


262—Steel Deck

Installation data and detail drawings are given in 16-page catalog B-56-A for use of steel deck on any type of building where flat, pitched, or arched roof construction is employed. Examples of its use for sidewalls, partitions, and floors are also shown along with advantages. Specifications and dimensions are given. *R. C. Mahon Co.*

263—Architectural Aluminum

"Alcoa Aluminum in Architecture," new 12-page booklet AD262, contains data for miscellaneous uses of aluminum in buildings, including specifications, details of installation, and selection of alloys and finishes. The booklet emphasizes use of Alcoa architectural colors with suggestions for their use. *Aluminum Company of America.*



264—Rolling Doors

Twelve-page bulletin 87 demonstrates how both wood and steel RoL-TOP doors, with their straight-line outward appearance, are well suited to modern building needs. Drawings show recommended types for various applications and clearances, types of operation, special features, and dimensions. *Kinnear Mfg. Co.*

265—Bridge Flooring

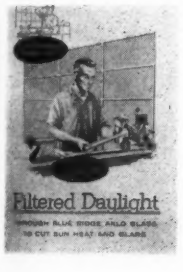
This 32-page booklet contains complete descriptions, specifications, drawings, and design data covering all types of AmBridge I-Beam-Lok. Also included are details of flooring applications plus a brief discussion showing how Composite Tee-Beam Action can be used with I-Beam-Lok. *United States Steel Corp., American Bridge Div.*

266—Steel Shop Equipment

The standard line of Hallowell steel shop equipment is covered in this six-page folder. It includes descriptions and dimensional specifications of various types of cabinet, work, and unit benches and accessories, regular and heavy duty portable benches, tool cabinets, stands, desks, and adjustable shelving. *Standard Pressed Steel Co.*

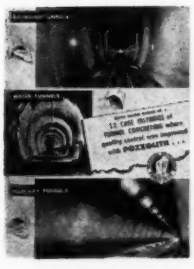
267—Welding Studs

Standard designs and specifications of KSM welding studs are covered in 36-page bulletin G-102. It includes a dimensional drawing of each type of fastener, materials in which each is available, plating, annealing, flux, and arc shield data. Brief descriptions of other welding products also are given. *KSM Products, Inc.*



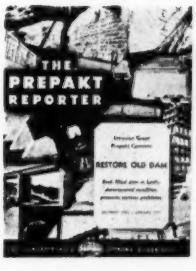
268—Filtered Daylight

Eight-page bulletin BRA 6 tells how Blue Ridge Aklo Glass filters daylight for better seeing, less eyestrain, and provides cooler interiors in new buildings or old. Information is given on how to select the right Aklo glass for specific applications. Photographs show typical installations in various types of industries. *Blue Ridge Glass Corp.*



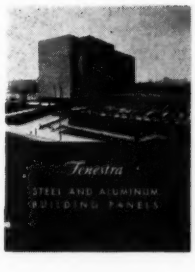
269—Concrete Control

Twelve case histories of successful control of concrete quality achieved during construction of major tunnel projects in the western hemisphere are presented in 28-page bulletin MBR-8. Discussion covers concreting problems in three basic types of tunnels and role of Pozzolith in achieving uniform quality. *The Master Builders Co.*



270—Structural Concrete Repair

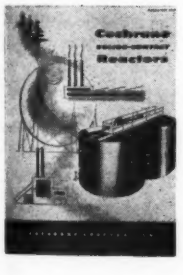
Eight-page booklet gives details on how a rock-filled dam in badly deteriorated condition was restored by use of Intrusion grout and Prepakt concrete. It shows before and after photographs. A cross-sectional diagram illustrates each stage of the repair, with an explanation of procedures that were followed. *Intrusion-Prepakt, Inc.*



271—Floor Panels and Roof Deck

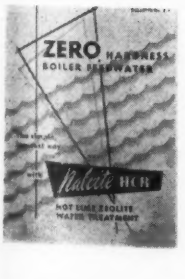
This catalog of engineering information on the Fenestra line of panels and deck for floors, ceilings, and roofs, covers Fenestra Electrifloor (cellular panel plus header duct system), panels for recessed lighting, acoustical panels, complete insulated roofs, and data for designing for seismic shear and wind load. *Fenestra, Inc.*

WATER TREATMENT AND WASTE DISPOSAL



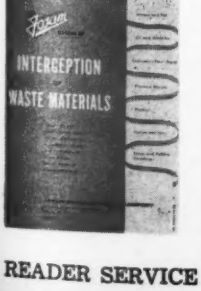
272—Solids-Contact Reactors

Bulletin 5001, 24 pages, on Solids-Contact Reactors, discusses theory and problems of cold water clarification, as well as advantages and applications of various designs, and gives data on auxiliary apparatus. Supplementing a cutaway photo are several pages of plan and elevation drawings showing wide variety of designs. *Cochrane Corp.*



273—Hot Lime Zeolite Method

Bulletin Z-1, four pages, describes the use and advantages of Nalcite HCR hot lime zeolite treatment for boiler feedwater. It includes a schematic drawing of a boiler system and water treating equipment. Analyses of different waters successfully treated for various conditions by Nalcite HCR are listed. *National Aluminate Corp.*

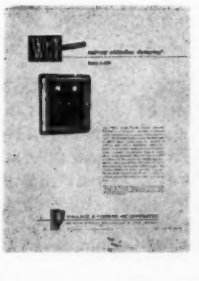


274—Industrial Wastes

"Interception of Waste Materials," 28-page Manual W, gives complete and authoritative data on the application, installation, sizing, and operation of interceptors for all types of waste materials, such as grease and fat, oil and gasoline, sediment, precious metals, plaster, cotton and lint, and glass and rubber grindings. *Josam Mfg. Co.*

275—Low-Headroom Deaerators

Ten-page bulletin W-210-B33 illustrates construction features and gives complete specifications on horizontal and vertical models of "Low-Headroom Deaerators." Included are engineering drawings, dimension and fitting tables, and ratings for deaerators with capacities from 17,500 to 80,000 lb per hr. *Worthington Corp.*



276—Chlorine Detectors

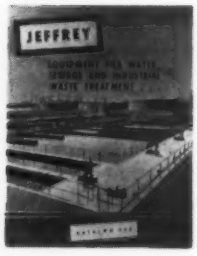
The W&T Series A-689 Solvay Chlorine Detector, a device for warning of chlorine concentrations in air in excess of a pre-selected value, is described in four-page bulletin 50.118. Technical data include use, mounting, electrical requirements, dimensions, accessories, air sampling, and sample line requirements. *Wallace & Tiernan, Inc.*

277—Deaerators

Basic principles and advantages of the Schaub Zero-Oxygen Deaerating System for the small and medium size boiler plant are presented in eight-page bulletin 575. A labeled cutaway view is used to explain operation under changing load conditions, piping connections, and the use of surge tanks. *Fred H. Schaub Engineering Co.*

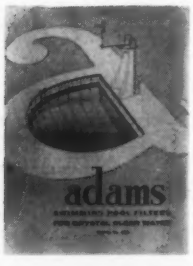
278—Chlorinators

A new concept in chlorine flow control —the V-notch Variable Orifice that permits a feed range of 20 to 1—is discussed in eight-page bulletin 25.110. The orifice is shown in cross section. Design features, method of operation, and technical data are presented. A simplified flow diagram also is given. *Wallace & Tiernan, Inc.*



279—Sanitation Equipment

Complete line of equipment for water, sewage, and industrial waste treatment is described in new 64-page catalog 905. It covers new traveling water screens and V-type Floctrols for small plants. Drawings, specifications, engineering data, and many recent, typical installation photographs are presented. *Jeffrey Manufacturing Co.*



280—Swimming Pool Filters

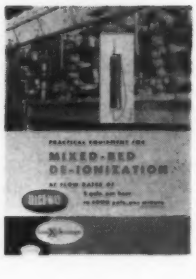
Bulletin 625, 24 pages, discusses filtration for modern swimming pools of 50,000 gal capacity and over. It has sections on design features of purification and filtering systems, operation phases of filtration cycle, choosing the right filter, installation drawings, dimension charts, and table of filter sizes. *R. P. Adams Co., Inc.*

281—Water Supply

"Supplying Water for Municipal and Industrial Use," 20-page catalog, explains how the Ranney Method can provide any type of water program for these users. Horizontal collectors, infiltration gallaries, vertubes, and intakes are fully described. Photographs and schematics depict each operation. *Ranney Method Water Supplies, Inc.*

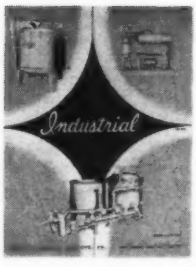
282—Reactivators

Basic principles of design and operation of the Graver Reactivator are explained in 12-page bulletin WC-103A. Typical flow diagrams are given for installations at a petroleum refinery, municipal water supply plant, feedwater at a boiler plant, and in a paper mill for recovering paper stock and water from white water. *Graver Water Conditioning Co.*



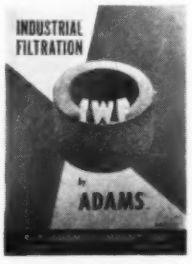
283—De-ionization

Equipment for mixed-bed de-ionization at flow rates of 5 gph to 5000 gpm is described in eight-page bulletin. Diagrams illustrate each phase of operation — service, backwash, simultaneous regeneration, and mixing. Packaged units shipped completely assembled with piping and controls are described briefly. *Illinois Water Treatment Co.*



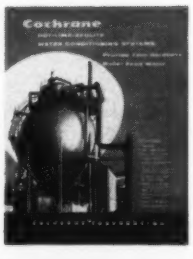
284—Water and Chemical Filters

Vertical leaf filters with a wide range of uses in chemical and water purification processes are described in eight-page bulletin 111-112-1155. Features such as "lift-out" leaves with top or bottom outlets, quick opening devices, jacketed shell for temperature control, and cleaning devices are illustrated. *Industrial Filter & Pump Mfg. Co.*



285—Industrial Filtration

How industrial filters lower production costs is explained in ten-page bulletin 651. Data on the new line of IWF filters include sectional views, typical installation drawings, dimension charts, and operational diagrams. Case histories of city water filtration and filtering of recirculation water are cited and illustrated. *R. P. Adams Co., Inc.*



286—Hot Lime-Zeolite

Publication 4801-A covers the versatility and economy of Cochrane Hot Lime-Zeolite Softeners. It deals with method of operation, expected results, chemical savings, and simplicity of operation. It also points out that with addition of the zeolite stage, application of hot process is broadened considerably. *Cochrane Corp.*

287—Self-Cleaning Fluid Filter

The Industrial Hydra-Shoc Filter, incorporating a new principle in filter design that uses sudden pressure drop for extremely fast cleaning, is described in four-page folder 114-1155. Colored flow diagrams illustrate the operating sequence—precoating, filtering, and Hydra-Shoc. Filter is vertical type. *Industrial Filter & Pump Mfg. Co.*

288—Filmeen Treatment

Control of corrosion in return lines through the use of Filmeen treatment is described in eight-page bulletin 5013-B. It explains how this product prevents corrosion caused by CO_2 or oxygen by forming a protective, monomolecular film on metal surfaces. Methods of application and testing are outlined for specific uses. *Dearborn Chemical Co.*

289—Demineralizers

Basic types of Graver demineralizers are presented by means of flow diagrams in 22-page bulletin WC-111. Tables and drawings are designed to assist in selection of the proper unit for various types of service, along with the piping and fittings required. Operating costs and performance curves are given. *Graver Water Conditioning Co.*

290—Water and Steam Cycles

"Industrial Water Treatment and Engineering Service" tells of the five basic lines of defense to guard against difficulties in water and steam cycles. A two-page diagram shows a water and steam cycle power plant layout and indicates the usual tests required on samples taken at designated points. *Dearborn Chemical Co.*